BHARAT HEAVY ELECTRICALS LIMITED
HEEP: HARDWAR-249 403 (UTTARAKHAND)
Fax: 01334-226462, Phone: 284144
E-mail: pkbansal@bhelhwr.co.in;

Tender no: PPX-F&HE/EOI/SL/16-17/01 **Due Date: 09/05/2016**

Notice for Expression of Interest for empanelment of New Vendors

The Heavy Electrical Equipment Plant (HEEP) located in Haridwar, is one of the major manufacturing plants of BHEL. The core business of HEEP includes design and manufacture of large steam and gas turbines, turbo generators, hydro turbines and generators and so on.

We are looking for reputed vendors having capability for supplying following materials-

Sl.	Description	Probable Sizes	Annual Requirement	Pre-Qualification Requirements/ Specification
1	**17% Mn Steel Non Magnetic Bars/Flats**: Austenitic Alloy Steel Bar Grade X40MnCrN19K as per BHEL specification **HW10784 Rev: 02**	Dia- 12, 16, 18, 26, 30, 36, 40, 42 & 45 mm	**17 MT**	**Annexure- I**
2	**IPB/IPBV Beams:** Wide parallel flange beam (ISWPB as per IS12778 or IPB as per DIN1025-Part-2) & IPBV as per DIN1025-Part-4 with raw material as per Grade E250, Quality A of IS: 2062 or S275JR/S355 as per DIN EN 10025-2 as per BHEL specification **AA10108 Rev: 11**. No construction welding is permitted for manufacturing IPB/IPBV/ISWPB beams.	IPB 100, 120, 160, 180, 200, 220, 240, 260, 300, 400, 500 mm, IPBV 160, 240, 260 mm, ISWPB 140×140×33.7 OR IPB 140 mm, ISWPB 160×160×42.59 OR IPB 160 mm.	**45 MT**	**Annexure- II**
3	**Creep Round Bars ESR Grade:** Steel Bars Grade X12CrMoWVNBN 10-1-1 as per BHEL Specification **HW10661 Rev: 00** and addendum to Spec. HW10661.	Dia- 25, 45, 55, 85, 110, 140, 160, 180, 225 & 240 mm	**16 MT**	**Annexure- III**
4	**Creep Round Bar- 9-12% CRMOV Steel:** **a.** Steel Bars Grade X10CrMoVNB9-1 as per BHEL specification **HW10662 Rev: 00** and addendum to specification.	Dia- 20, 25, 30, 45, 55, 65, 105, 115, 125, 150, 160 & 200 & 240 mm	**10 MT**	**Annexure- IV**
	b. Steel Bars Grade X18CrMoNbVN11-1+QT as per BHEL specification **HW18814 Rev: 01** and addendum to specification.	Dia- 25, 35, 50,60, 85, 110 & 140 mm	**30 MT**	**Annexure- V**

Contact persons:

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The offers received will be technically evaluated by BHEL & successful short listed parties will be asked to submit their detailed Techno-Commercial offers through formal NIT/Enquiry for our future requirements. Vendors shall confirm that there is no deviation with respect to BHEL Specifications. However deviations, if any are to be listed as a separate attachment. The offers that do not meet the substantial requirements of our specifications are liable to be ignored.

Following documents are to be necessarily filled and submitted along with the technical offer:

1. Details/ Documents in support of Specification/PQR (**Annexure-I, II & III, IV & V up-loaded**)
2. Quality Requirements **(Annexure- VI) & Quality Plan format (Annexure-VII).**
3. **Supplier/Vendor Registration Form-** Go through online supplier registration portal https://supplier.bhel.in/ . After filling the online registration form send the copy of same along with your offer within due date.
4. Details of Manufacturing Facility
5. Company Profile.
6. Financial report of the company.
7. Past experience along with documentary proof.

Only Technical BID along with the documents mentioned above should be sent and the envelope containing the offer shall be duly sealed and super scribed as "**Technical Offer for (ITEM NAME) AGAINST Tender No. PPX-F&HE/EOI/SL/16-17/01**

Due Date-09.05.2016, SUBMITTED BY (Name of company)"

- This notification shall be published on ***www.bhel.com***, ***www.tenders.gov.in*** and ***www.bhelhwr.co.in***
- Last date for downloading tender documents shall be 08.05.2016 till 1700 Hrs.(IST). Tenders will be received up to 13:45 Hrs. (IST) on 09.05.2016 will be considered and opened on the same day at 14:00 Hrs. (IST) in the Tender Room BHEL HEEP, Haridwar.
- Technical Offers complete in all respect must be addressed to "Shri P K BANSAL, AGM (PPX-F)".
- EMD & Tender fee are not applicable.
- The Quotation should be from the Principal / Original Manufacturer, failing which the quotation may likely to be ignored. In Case the quotation is submitted through agent, the quotation must accompany original authorization letter.
- Late offers will not be considered in any case. BHEL will not be responsible for any type of postal delay / incomplete information from vendor.
- Amendments / Corrigendum, if any, will be hosted on our web site only.

For any further details please log on to *www.bhel.com* or ***www.tenders.gov.in*** or ***www.bhelhwr.co.in***

(P K BANSAL)
AGM (PPX- F & HE)

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ANNEXURE-I

Pre-Qualification Requirements for Round Bars of material grade X40MnnCrN19-

1. Vendor must have experience of manufacturing and supplying round bars of material grade X40MnCrN19 (material number 1.3813). Details of the experience for material grade X40MnCrN19 is to be submitted in the format given below:

Sl. No	Name of customer	Purchase order No	Dimensions (Diameter X Length)	Year of supply	Quantity

Test certificates covering chemical composition, mechanical properties, non-destructive test report and dimension reports of above purchase orders of rounds of material grade X40MnCrN19 are to be submitted with offer.

2. Vendor must have in-house rolling/forging/cold drawing, heat treatment facilities to manufacture round bars of material grade X40MnCrN19 as per BHEL specification HW10784.
3. Vendor to submit in house steel melting including secondary refining facility details. In case in house steel melting facility not available in house, vendor to inform their source for raw material. Details of steel melting with secondary refining facility and experience for material grade X40MnCrN19 to be submitted.
4. Details of the testing facilities (in-house or outsourced) are to be submitted. In case of outsourcing of any test, vendor to submit details of testing house. Testing shall be carried out at Government accredited labs only.
5. Vendor to confirm that they will meet all the requirements of BHEL specification HW10784.

AUSTENITIC ALLOY STEEL BAR (ROUNDS & FLATS) (X 40 MnCrN19K)

1. GENERAL:

This specification governs the requirements of cold drawn steel bars of grade X40MnCrN19K (Material No.: 1.3813) round and flats.

2. APPLICATION:

The steel bar shall be used for manufacture of tension bolts, press fingers etc.

3. DIMENSIONS & TOLERANCE:

3.1 The dimensions of the bar shall be stated on the order.

3.2 The tolerances shall be as per Annexure - I.

4. MANUFACTURE:

The bars can either be rolled or forged provided that the required mechanical properties in cold drawn condition are fulfilled.

5. CHEMICAL COMPOSITION:

The material shall conform to the chemical composition shall be as follows:

Carbon	Silicon	Manganese	Chromium	Nitrogen	Sulphur	Phosphorus
0.30-0.50	≤ 0.50	18.0-20.0	3.00-5.00	0.080-0.120	≤ 0.015	≤ 0.050

6. MECHANICAL PROPERTIES:

A hardness test shall be performed to verify the uniformity of the strength within a delivery lot (per melt and heat treatment batch). The test amount shall be 10% of the bars with a minimum of 10 bars. When the lot consists of less than 10 bars all bars shall be tested.

The mechanical properties are to be determined on both the hardest and softest bar for each melt and heat treatment batch.

The specimen is to be taken in longitudinal direction from centre of the bars.

0.2% Proof stress and tensile strength shall be determined on each and every cross-section.

				नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
TSX	B. CHOUDHARY	20/05/10			
IPSC	V.K. Chauhan	17/5/10	अनुवादक TRANSLATED BY		
STE	D K Rory	18.5.10	निर्माणकर्ता WORKED BY	SKumar	5/5/10
QAX	N.K. Marwah	10.5.10	जांचकर्ता CHECKED BY	Ashish	5/5/10
सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	JP MEENA	18/5/10

स्वीकृति : संस्थान मानक समिति
APPROVED : PLANT STANDARDS COMMITTEE — G.No. 2.60

Rev. 02 Dt. 17.05.10 — SUPERSEDES

निर्माण : PREPARED : MTE | जारी : मानक विभाग ISSUED : STANDARDS DIVISION | दिनांक : DATE : 24.3.81

हस्ताक्षर एवं दिनांक SIGN & DATE 21.5.10
सामग्री सूची संख्या INVENTORY NO. P-2230

Following properties shall be achieved at room temperature:

0.2 % Proof Stress:	≥ 500 N/mm^2
Tensile Strength:	850 – 1250 N/mm^2
Elongation (l_0=5d) (%):	≥ 20%
Reduction in area:	≥ 35%
Impact Energy (J):	≥ 90 *
Hardness (HB30):	260 - 360

*Average of 3 Charpy V-notch specimens

7. NON DESTRUCTIVE TEST:

7.1 Scope of inspection:

Following NDT shall be performed in delivery condition for all bars

- Verification Test
- Complete ultrasonic inspection (UT) according to EN 10308 type 1a-1c (table1)
- Liquid penetrate test according to EN 10228-2 or according to any other technique that guarantees achieving the requested registration and decision criteria

7.2 Criteria for Registration and decision.

7.2.1 **UT Inspection**

Regarding UT inspection quality class 3 according to EN 10308 (table 3) shall be the acceptable norms. The decision limit for loss of back wall echo is 3 dB for all bar dimensions. Any linear or surface- like in homogeneity larger than 10mm in any direction is not accepted.

7.2.2 Surface crack inspection

Quality class 4 according to EN 10228-2 (table 1) shall be applied.

8.0 TEST CERTIFICATES:

The supplier shall furnish four copies of test certificates unless and otherwise stated on the order:

8.1 BHEL'S Reference

Purchase Order

Specification Number

8.2 Supplier's Reference:

Name or emblem of the supplier

Material Designation

Melt No.

Steel melting process

Complete detail of heat – treatment

8.3 Results of Testing

8.3.1 Chemical Analysis

8.3.2 Mechanical Properties. All individual values are to be given.

8.3.3 Type and results of non-destructive testing and final surface inspection.

8.3.4 Verification test Confirmation

8.4 Dimensional Results;

8.4.1 Diameter, Length, Straightness of rounds.

Length, Width, Height, Straightness, and Twist of flats.

8.4.2 100% dimensional checking by supplier and reporting 10% for actual dimension in TC.

9. CLEARANCE FOR DELIVERY:

The total results of all the tests carried out are decisive for clearance for delivery. BHEL evaluates the total results taking into consideration the intended use of material and examines accordingly the permissibility of deviation (if any) from the specified properties.

The clearance, however, does not relieve the supplier of his responsibilities for the hidden/ unreported non-permissible defects which are found at latter.

10.0 PACKING AND MARKING:

10.1 All bars shall be marked with the supplier's identification, material designation and melt number. The marking shall be clearly punched and bordered with oil paint.

10.2 The bars shall be suitably packed and protected against corrosion and damage during transportation.

11.0 CROSS REFERRED STANDARD: EN 10228 -2, EN 10308

Annexure-I

I. FOR ROUND BARS:

1. Tolerance on round bars shall be as follows:

DIAMETER (MM)	PERMISSIBLE TOLERANCE
UPTO 1.6	-0.050
1.7 to 3.0	-0.060
3.2 to 6.0	-0.075
6.3 to 10.0	-0.090
10.3 to 18.0	-0.110
18.3 to 30.0	-0.130
32.0 to 50.0	-0.160
52.0 to 80.0	-0.190
85.0 to 120.0	-0.220

2. TOLERANCE ON STRAIGTHNESS: ± 0.50 mm/ Meter

II. FOR FLAT BARS :

1. Tolerance on flat bars shall be as follows: :

SIZE (mm)	WIDTH (mm)	HEIGHT (mm)	LENGTH (mm)
42X25	25±0.5	42±1	630(+10,-0)

2. TOLERANCE ON STRAIGHTNESS : ±0.25 mm/ Meter
3. TWISTING TOLERANCE : ± 0.25 mm/ Meter

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ANNEXURE-II

Pre-Qualification Requirements for IPB/IPBV Beams-

1. Welded beam is not acceptable.

2. Vendor must have experience of manufacturing and supplying IPB/IPBV beams as per IS: 12778 or DIN 1025 (e.g. IPB 100, 200, 300; IPBV 260, 240 etc). In support of experience vendor to submit details in the following format:

Sl. No.	Name of customer	Purchase order No.	Size	Year of supply	Quantity

Test certificates of past supplies are to be submitted in support of experience.

3. Vendor must meet any one of the following manufacturing facility requirement:

   Vendor must have in house steel melting and rolling facility to manufacture IPB/IPBV beam as per IS: 12778 or DIN 1025.

   Or

   Vendor having in house rolling facility but in house steel melting facility not available. Vendor has to submit details of their source of raw material with their manufacturing facilities.

   Or

   Vendor having in house steel melting facility but in house rolling facility not available. Vendor has to submit details of their source of rolling with their manufacturing facilities.

4. Material shall be as per IS: 2062, E250 Gr A or S275JR, EN10025 or S355, EN10025

5. Certification / Approval for IPB/IPBV beam from BIS/TUV/BVQI etc., if available, may be submitted.

STRUCTURAL STEEL-STANDARD QUALITY

(PLATES, SECTIONS, STRIPS, FLATS & BARS)

(ORDERING DESCRIPTION)

1.0 GENERAL:

This specification governs the quality requirements of structural steel plates, strips, flats, bars and sections such as angles, beams, channels and tees etc. of IS: 2062 – 2011, Gr: E250, Quality A

2.0 APPLICATION:

For general engineering purpose.

3.0 CONDITION OF DELIVERY:

Plates, Bars & Sections: Hot rolled in straight lengths without twists & Bends

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

Material shall comply with the requirements of IS: 2062 – 2011, Gr: E250, Quality A

Material offered to EN 10025-2:2004 Gr. S275JR is also acceptable. The tolerance on dimensions for plates shall comply with EN 10029.

5.0 DIMENSIONS AND TOLERANCES:

5.1 DIMENSIONS:

5.1.1 Sizes

Material shall be supplied to the dimensions specified on BHEL Order.

5.1.2 Length

Unless otherwise specified, hot rolled bars and sections shall be supplied in 3 to 6 metres length.

5.2 Tolerances:

5.2.1 The tolerances on hot rolled material shall comply with IS: 1852. However, no plate shall be under the specified thickness at any point.

24/2/14

CS-1059

CORPORATE PURCHASING SPECIFICATION

5.2.2 Straight for hot rolled bars:

Unless otherwise specified, the permissible deviation in straightness shall not exceed 5 mm in any 1000 mm length.

6.0 HARDNESS (BRINELL):

When tested in accordance with IS: 1500, the material shall show a brinell hardness in the range of 120-156 HB.

Note: Hardness test shall be conducted only when tensile test cannot be performed.

7.0 TEST CERTIFICATES:

Unless otherwise specified, three copies of test certificates shall be supplied.

In addition, the supplier shall ensure to enclose one copy of the test certificate along with their dispatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information.

AA10108 Rev.11 / IS:2062 Grade: E250 Quality A / EN 10025-2 Gr. S275JR,

BHEL order no., Melt no. Size, Results of chemical analysis and Mechanical tests, Supplier's name, Identification no. TC no., Signature of competent authority etc.

8.0 PACKING AND MARKING:

Plates shall be transported suitably to avoid damage during transit.

For plates below 10 mm thick, each pile (preferably of 16 plates) and each plate 10 mm thick & over shall be marked with melt no. AA10108, BHEL order no., Supplier's name, Identification no., Size & weight on any one corner and encircled with paint preferably of white colour.

9.0 REFERRED STANDARDS (Latest publications including amendments):

1) IS: 1500 2) IS: 1852 3) EN 10029

CS-1059 24/4/14

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ANNEXURE-III

Pre-Qualification Requirements for Round Bars of material grade X12CrMoWVNbN10-1-1, Specification HW10661 with addendum-

Round bars of material grade X12CrMoWVNbN10-1-1 shall be used in Steam Turbine High Temperature application. Material shall be subjected to creep condition.

1. Vendor must have experience of manufacturing and supplying forged/rolled bars of material grade X12CrMoWVNbN10-1-1. In support of experience, vendor to submit details of past three supplies in the format given below:

Sl. No	Name of customer	Purchase order No	Size	Year of supply	Quantity

Vendor to submit test certificates covering chemical, mechanical, heat treatment details, non-destructive test etc of purchase order referred above in support of experience.

2. Vendor must have in-house manufacturing facilities like melting, secondary refining including electro slag re-melting facility, rolling / forging, heat treatment etc. to manufacture round bars as per BHEL specification HW10661 with addendum**.**
Outsourcing of any of above operation is not acceptable.
Vendor shall submit following manufacturing details with relevant supporting documents:
- Steel melting facility, secondary refining including electro slag re-melting facility
- Rolling facility - Minimum and maximum dimension which can be rolled (diameter and length)
- Forging facility - Press / Hammer details - Minimum and maximum dimension which can be forged (diameter and length)
- Heat Treatment - Furnace details, quenching media (air, oil, polymer) etc, Furnace calibration certificates for uniformity of temperature within the furnace at different zones

3. Vendor to furnish in house testing facilities to carry out testing as per the requirements of BHEL specification HW10661. In case of outsourcing of any test, vendor to submit details of testing house. Testing shall be carried out at Government accredited labs only.

4. Vendor to confirm that they will meet all the requirements of BHEL specification HW10661 with their addendum.

5. Creep Rupture data for material grade X12CrMoWVNbN10-1-1, if available, may be submitted.

SUPERSEDES INVENTORY NO. TI.V 9258/10, Feb'08

STEEL BARS GRADE X12CrMoWVNb N10-1-1

1.0 GENERAL:

This specification governs the quality of steel Bars of grade X12CrMoWVNbN 10-1-1, material no. 1.4906.

2.0 APPLICATION:

For turbine components.

3.0 CONDITION OF DELIVERY:

Rolled / forged and Heat Treated.

4.0 DIMENSION AND TOLERANCES :

Bars shall be supplied to the dimension specified on the purchase order.

Length:

- Unless otherwise stated in the order, hot rolled bars shall be supplied in 3 to 6 meters length or in multiples with maximum of 10 percent short down to 1 meter.
- Forged bars shall be supplied in lengths of 1.5 to 3 meters.

Tolerances:

Hot Rolled Bars:

The bars shall not vary from specified diameter or distance across flats by more than 2.5%.

Forged bars:

The tolerance on the forged bars shall be as follows:

Diameter, mm	Tolerance, mm
50 to 125	+ 6.0
125 to 175	+ 8.0
> 175	+ 12.5

Insignificant surface defect in the form of dent and ripple marks are permissible provided their depth does not exceed half the tolerance on each size.

5.0 MANUFACTURE:

ESR steel shall be used. Use of any other steel secondary treatment is to be agreed in advance with BHEL. Cast ingot is to be used as starting material for the production of bars.

The bars can either be rolled or forged provided that the requested mechanical properties are fulfilled.

6.0 CHEMCIAL COMPOSITION:

Heat analysis in weight % :

Element	C	Si	Mn	P	S	Cr	Mo	Ni	W	V	N	Al	Nb
Min.	0.11	--	0.40	--	--	10.2	1.00	0.70	0.95	0.15	0.045	--	0.04
Max.	0.13	0.12	0.50	0.010	0.005	10.8	1.10	0.80	1.05	0.25	0.060	0.010	0.06

The content of trace elements such as Cu, As, Sb, Sn and Ti shall be given for information in test certificate.

TSX	B. CHOUDHARY	25.01.11		नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
MRC & PSC	V.K.CHAUHAN	25.1.11			
STE	D.K. RAY	21.1.11	अनुवादक TRANSLATED BY		
QAX	N.K.MANWANI	19.1.11	निर्माणकर्ता WORKED BY	Pankaj Agarwal	14.01.11
			जांचकर्ता CHECKED BY	Ashish Ranjan	14.01.11
सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	Gopal Krishnan	14/1/11
			स्वीकृति : संस्थान मानक समिति APPROVED : PLANT STANDARDS COMMITTEE		Gr.No 2.60
REV. NO. 00 Dt. 14.01.2011			निर्माण : PREPARED : MTE	जारी : मानक विभाग ISSUED : STANDARDS DIVISION	दिनांक : DATE : 14.01.2011

दिनांक एवं हस्ता. पर SIGN & DATE
सामग्री सूची संख्या INVENTORY NO.

7.0 HEAT TREATMENT:

Bars shall be supplied in quenched and tempered condition. A martensitic microstructure shall be obtained along the whole section of the bar.

Quench Hardening: 1050 - 1100° C/ air or liquid quenching

Tempering: At least two times

Level 1: T1 = 570°C/ 4 hour/air or liquid

Level 2: $T_2 \geq 700°C$

If bars need to be straightened after heat treatment, stress relieving is mandatory after completion of entire straightening process. The stress relieving shall be carried out at 20 - 50°C below the tempering temperature with a subsequent slow cooling rate.

8.0 MECHANICAL PROPERTIES:

The specimens are to be taken in longitudinal (L) direction according to EN10083-1. For bars with diameter (d) or side length (a, b) > 100mm, the specimens shall be taken at a distance d/3 for round and a/3, b/3 for rectangular bars from the respective surfaces. In this case, transverse specimens (T) are also allowed.

In case of manufacturinEg machined components, following condition to be met:

A hardness test shall be performed to verify the uniformity of the strength within a delivery lot (per melt and heat treatment batch). The test amount shall be 10% of the bars with a minimum of 10 bars. When the lot contains less than 10 bars, all bars shall be tested. The mechanical properties shall be tested on both the softest and hardest bars.

If raw parts are to be manufactured from forged bar, which is forged to different diameter, the following requirements shall be met:

For a ratio of up to 1.25 (according to EN10269, clause 10.1.2) between the diameter of the taper shank and the shaft section of valve stem, the testing of mechanical properties is to be done only on bigger diameter

In case of a ratio of diameter > 1.25 mechanical properties shall be tested on all diameters.

Impact energy test shall be performed on bars having side length ≥ 10mm or diameter ≥ 15mm respectively.

The following Mechanical properties shall be achieved at room temperature

Diameter (d) Side length (a^{1}) (mm)	0.2% Proof Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation $l_0 = 5d$ (%)		Reduction in area (%)		Impact Energy J		Hardness HB30
			L	T	L	T	L	T	
d, a ≤100	700 - 800	≤ 1000	≥ 14	-	≥ 50	-	≥ 40[2)]	-	260 - 310
100 < d, a	700 - 800	≤ 1000	-	≥ 13	-	≥ 40	-	≥ 24[2)]	260 - 310

[1)] The values of the smallest side length (a) shall be reached.

[2)] Average of 3 Charpy V-notch specimen, longitudinal or transverse

9.0 OUTER AND INNER QUALITY / NON DESTRUCTIVE TESTING:

9.1 SURFACE CONDITION:

Cracks, other material separation or more severe linear inclusions lines are only acceptable when located in the dimensional tolerances area.

9.2 **SCOPE OF INSPECTION:**

Following NDE shall be performed in delivery condition:

- Verification inspection of all bars
- 100% U.T of all bars with diameter $30 \leq d \leq 500$ mm according to EN10308 type 1a - 1c (table 1)

9.3 CRITERIA FOR REGISTRATION AND DECISION:

For ultrasonic inspection following quality classes according to EN10308 (table 2) shall be applied depending upon the diameter (d) or side length (a, b):

- d or (a, b) ≤ 200mm: Quality class 4
- d or (a, b) > 200mm: Quality class 3

The decision limit for loss of back wall echo is 3 dB for all bar dimensions.

Any linear or surface like inhomogenity larger than 10mm in any direction is not acceptable.

This quality requirement applies also for bars having diameter d <30mm, although it is not necessary to prove by testing.

Regarding forged bars with two different diameters, a 45° – transducer shall be used for sectional variations over the entire 360°.

Defects that will be cut during final machining shall be evaluated individually.

10.0 MARKING:

The marking of the materials shall be such that heat no., steel grade/specification & manufacturer name / identifications are legible.

11.0 TEST CERTIFICATES:

The supplier shall supply four copies of test certificates as per EN 10204, certificate3.1 B, unless otherwise stated on the order. The test certificates shall bear the following:

- BHEL References:
- Specification no., Purchase orders no.
- Suppliers references: Name, emblem, material designation, melt no, Heat-treatment batch no.
- Results of Testing:
- Melting process, melt analysis,
- Mechanical properties, all individual values shall be reported
- Details of Heat-treatment performed,
- U.T result
- Confirmation of the verification inspection

12.0 CLEARANCE FOR DELIVERY :

The total results of the tests carried out are the deciding factor for clearance for delivery. BHEL shall evaluate the total results taking into consideration the intended use of the material and examines accordingly the permissibility of deviation (if any) from the specified properties.

The clearance however does not relieve the supplier of his responsibility for the hidden non-permissible defects, which are found later.

13.0 CROSS REFERRED STANDARDS:

EN 10269, EN 10083-1, EN 10308, EN10204,

Addendum to Specification HW10661

(Material Grade: X12CrMoWVNbN10-1-1)

PRODUCT AND PROCESS QUALFICATION:

1.0 General:

Product and process qualification procedures are required for first order. The product and process qualification is required for each of the manufacturer's fabrication facility.

Depending on the complexity of the product and / or process and experience from the first orders, requirement of additional process qualification in subsequent orders shall be reviewed by BHEL.

Prior to the start of manufacture, the manufacturer has to submit a manufacturing and testing plan to BHEL in which the quality assured process workflow, i.e. the sequence of process activities (manufacturing, testing and inspection steps) are specified in chronological order.

BHEL must be informed for any change in manufacturing and testing processes. Depending on the type and scope and thus the significance of any given change, BHEL will decide whether it is necessary to requalify the product and/or process.

Subcontracting of process steps to sub suppliers is only acceptable after written approval from BHEL.

1.1 <u>The following additional tests have to be performed during qualification:</u>

1.1.1 <u>Tensile tests at elevated temperature</u>

In accordance with EN 10002-5 a tensile test (in the same direction as at room temperature) has to be performed at 600°C.

Following properties must be achieved:

0.2% Proof Stress	≥ 365 Mpa,
Tensile Strength	≥ 415 MPa,
Elongation (l_0=5d)	≥ 18%
Reduction in area	≥ 65%

1.1.2 Microstructure Examination

The homogeneity of the microstructure has to be checked and documented by microsection. The microstructure must be uniform and free from porosity, excessive segregation and other inhomogeneities.

A Delta ferrite content > 5% is not acceptable.

The inclusion content has to be determined in accordance with ASTM E 45.

The grain size must be measured after all heat treatments have been performed in accordance with ASTM E 112 or ISO 643. Grain size 4 or finer must be achieved. A deviation from the average grain size of more than 2 grain sizes is not permissible.

2.0 Cross Referred Standards:

1. EN 10002-5
2. ASTM E112
3. ISO 643
4. ASTM E-45

19/1/12

(T. S. Gopal Krishnan)
SDGM/MTE
HEEP, BHEL, Haridwar

19.01.12

(Ashish Ranjan)
Dy. Mgr/MTE
HEEP, BHEL, Haridwar

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ANNEXURE-IV

Pre-Qualification Requirements for Round Bars of material grade X10CrMoVNb9-1, Specification HW10662 with addendum-

Round bars of material grade X10CrMoVNb9-1 shall be used in Steam Turbine High Temperature application. Material shall be subjected to creep condition.

1. Vendor must have experience of manufacturing and supplying forged/rolled bars of material grade X10CrMoVNb9-1. In support of experience, vendor to submit details of past three supplies in the format given below:

Sl. No	Name of customer	Purchase order No	Size	Year of supply	Quantity

Vendor to submit test certificates covering chemical, mechanical, heat treatment details, non-destructive test etc. of purchase order referred above in support of experience.

2. Vendor must have in-house manufacturing facilities like melting, secondary refining including vacuum degassing facility, rolling / forging, heat treatment etc. to manufacture round bars as per BHEL specification HW10662 with addendum.
Outsourcing of any of above operation is not acceptable.
Vendor shall submit following manufacturing details with relevant supporting documents:
   - Steel melting facility, secondary refining including vacuum degassing facility
   - Rolling facility - Minimum and maximum dimension which can be rolled (diameter and length)
   - Forging facility - Press / Hammer details - Minimum and maximum dimension which can be forged (diameter and length)
   - Heat Treatment - Furnace details, quenching media (air, oil, polymer) etc., Furnace calibration certificates for uniformity of temperature within the furnace at different zones
3. Vendor to furnish in house testing facilities to carry out testing as per the requirements of BHEL specification HW10662. In case of outsourcing of any test, vendor to submit details of testing house. Testing shall be carried out at Government accredited labs only.
4. Vendor to confirm that they will meet all the requirements of BHEL specification HW10662 with their addendum.
5. Creep Rupture data for material grade X10CrMoVNb9-1, if available, may be submitted.

SUPERSEDES INVENTORY NO: TLV 9242/02, Feb'09

STEEL BARS GRADE X10CrMoVNb9-1

1.0 GENERAL:

This specification governs the quality of steel Bars of grade X10CrMoVNb9-1 according to EN10222 material no. 1.4903.

2.0 APPLICATION:

For turbine components.

3.0 CONDITION OF DELIVERY:

Rolled / forged and Heat Treated.

4.0 DIMENSION AND TOLERANCES :

Bars shall be supplied to the dimension specified on the purchase order.

Length:

- Unless otherwise stated in the order, hot rolled bars shall be supplied in 3 to 6 meters length or in multiples with maximum of 10 percent short down to 1 meter.
- Forged bars shall be supplied in lengths of 1.5 to 3 meters.

Tolerances:

Hot Rolled Bars:

The bars shall not vary from specified diameter or distance across flats by more than 2.5%.

Forged bars:

The tolerance on the forged bars shall be as follows:

Diameter, mm	Tolerance, mm
50 to 125	+ 6.0
125 to 175	+ 8.0
> 175	+ 12.5

Insignificant surface defect in the form of dent and ripple marks are permissible provided their depth does not exceed half the tolerance on each size.

5.0 MANUFACTURE:

Steel shall be manufactured by the electric melting furnace and subsequently suitably refined. Any other process of steel melting shall be subjected to mutual agreement between supplier and BHEL. The bars shall either be rolled or forged provided that the requested mechanical properties are fulfilled.

6.0 CHEMCIAL COMPOSITION:

Heat analysis in weight % according to EN 10222-2 except for Al content

Element	C	Si	Mn	P	S	Ni	Cr	Mo	V	Nb	N	Al
Min.	0.08	--	0.30	--	--	---	8.00	0.85	0.18	0.06	0.030	--
Max.	0.12	0.50	0.60	0.025	0.015	0.40	9.50	1.05	0.25	0.10	0.070	0.020

हस्ताक्षर एवं दिनांक SIGN & DATE	TSX	B. CHOUDHARY	31/1/11		नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
	PSC	V.K.CHAUHAN				
	STE	R.C.AGARWAL	3.1.11	अनुवादक TRANSLATED BY		
	QAX	N.K.MANWANI	1.1.11	निर्माणकर्ता WORKED BY	Pankaj Agarwal	27.12.10
				जांचकर्ता CHECKED BY	Ashish Ranjan	27.12.10
सामग्री सूची संख्या INVENTORY NO. P- 4092	सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	Gopal Krishnan	27.12.10
				स्वीकृति : संस्थान मानक समिति APPROVED : PLANT STANDARDS COMMITTEE		Gr.No 2.60
	REV. NO. 00 Dt. 27.12.10			निर्माण PREPARED : MTE	जारी : मानक विभाग ISSUED : STANDARDS DIVISION	दिनांक : DATE : 27.12.2010

7.0 HEAT TREATMENT:

Quench Hardening: 1040 - 1090° C/ air, oil, polymer*

Tempering: 730°C - 780°C / air, furnace

*In case of polymer the cooling rate shall be comparable to cooling with oil.

If bars need to be straightened after heat treatment, stress relieving is mandatory after completion of entire straightening process. The stress relieving shall be carried out at 20 - 30°C below the tempering temperature with a subsequent slow cooling rate.

8.0 MECHANICAL PROPERTIES:

A hardness test shall be performed to verify the uniformity of the strength within a delivery lot (per melt and heat treatment batch). The test amount shall be 10% of the bars with a minimum of 10 bars. When the lot contains less than 10 bars, all bars shall be tested. The mechanical properties shall be tested on both the softest and hardest bars.

The specimens are to be taken in longitudinal direction (L) according to EN10083 -1.

For bars with diameter (d) respectively side lengths (a, b) > 100mm, the specimens shall be taken at a distance d/3 respectively a/3 and b/3 from respective surfaces. For this case, transverse specimens (T) are also acceptable.

Impact energy test shall be performed on bars having side length ≥ 12mm or diameter ≥ 16mm respectively.

The following Mechanical properties shall be achieved at room temperature

Diameter (d) Side length (a^{1}) (mm)	0.2% Proof Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation $l_0 = 5d$ (%)		Impact Energy J		Hardness HB30
			L	T	L	T	
d ≤ 225 a ≤ 180	≥ 450	620 - 850	≥ 20	≥ 18	≥ 68 [2)]	≥ 68 [2)]	195 - 265
225 < d ≤ 600 180 < a ≤ 400	≥ 430	600 - 830	≥ 20	≥ 18	≥ 68 [2)]	≥ 68 [2)]	185 - 255

[1)] The values of the smallest side length (a) shall be reached.

[2)] Average of 3 Charpy V-notch specimen, longitudinal or transverse

9.0 OUTER AND INNER QUALITY / NON DESTRUCTIVE TESTING:

9.1 SURFACE CONDITION:

Cracks, other material separation or more severe linear inclusions lines are only acceptable when located in the dimensional tolerances area.

9.2 **SCOPE OF INSPECTION:**

Following NDE shall be performed in delivery condition:

- Verification inspection of all bars
- 100% U.T of all bars ≥ 30 mm thickness / diameter according to EN10308 type 1a - 1c (table 1)

9.3 CRITERIA FOR REGISTRATION AND DECISION:

For ultrasonic inspection following quality classes according to EN10308 (table 2) shall be applied depending upon the diameter (d) or side length (a,b):

- d respective (a, b) ≤ 200mm: Quality class 4
- d respective (a, b) > 200mm: Quality class 3

The decision limit for loss of back wall echo is 3 dB for all bar dimensions. Every linear or surface like inhomogenity larger than 10mm in any direction is not acceptable.
This quality requirement applies also for bars having diameter d, a <30mm, although it is not necessary to prove by testing.

10.0 MARKING:

The marking of the materials shall be such that heat no., steel grade/specification & manufacturer name / identifications are legible.

11.0 TEST CERTIFICATES:

The supplier shall supply four copies of test certificates as per EN 10204, certificate3.1 B, unless otherwise stated on the order. The test certificates shall bear the following:

- BHEL References:
- Specification no., Purchase orders no.
- Suppliers references: Name, emblem, material designation, melt no, Heat-treatment batch no.
- Results of Testing:
- Melting process, melt analysis,
- Mechanical properties, all individual values shall be reported
- Details of Heat-treatment performed,
- U.T result
- Confirmation of the verification inspection

12.0 CLEARANCE FOR DELIVERY :

The total results of the tests carried out are the deciding factor for clearance for delivery. BHEL shall evaluate the total results taking into consideration the intended use of the material and examines accordingly the permissibility of deviation (if any) from the specified properties.
The clearance however does not relieve the supplier of his responsibility for the hidden non-permissible defects, which are found later.

13.0 CROSS REFERRED STANDARDS:

EN 10222, EN 10083-1, EN 10308, EN10204,

Addendum to Specification HW10662

(Material Grade: X10CrMoVNb9-1)

PRODUCT AND PROCESS QUALFICATION

1.0 General:

Product and process qualification procedures are required for first order. The product and process qualification is required for each of the manufacturer's fabrication facility.

Depending on the complexity of the product and / or process and experience from the first orders, requirement of additional process qualification in subsequent orders shall be reviewed by BHEL.

Prior to the start of manufacture, the manufacturer has to submit a manufacturing and testing plan to BHEL in which the quality assured process workflow, i.e. the sequence of process activities (manufacturing, testing and inspection steps) are specified in chronological order.

BHEL must be informed for any change in manufacturing and testing processes. Depending on the type and scope and thus the significance of any given change, BHEL will decide whether it is necessary to requalify the product and/or process.

Subcontracting of process steps to sub suppliers is only acceptable after written approval from BHEL.

1.1 The following additional tests have to be performed during qualification:

1.1.1 Tensile tests at elevated temperature

In accordance with EN 10002-5 a tensile test in longitudinal direction has to be performed at 600°C. Following properties must be achieved:

0.2% Proof Stress	≥ 215 Mpa,
Tensile Strength	≥ 255 MPa,
Elongation (l_0=5d)	≥ 22%
Reduction in area	≥ 66%

1.1.2 Microstructure Examination

The homogeneity of the microstructure has to be checked and documented by microsection. The microstructure must be uniform and free from porosity, excessive segregation and other inhomogeneities.

Delta ferrite content > 5% is not acceptable.

The inclusion content has to be determined in accordance with ASTM E 45.

The grain size must be measured after all heat treatments have been performed in accordance with ASTM E 112 or ISO 643. Grain size 4 or finer must be achieved. A deviation from the average grain size of more than 2 grain sizes is not permissible.

2.0 Cross Referred Standards:

1. EN 10002-5
2. ASTM E112
3. ISO 643
4. ASTM E-45

19/1/12

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HEEP, BHEL, Haridwar

19.01.12

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ANNEXURE-V

Pre-Qualification requirements for round bars of material grade X18CrMoNbVN11-1+QT, Specification HW18814 with addendum-

Round bars of material grade X18CrMoNbVN11 - 1 shall be used in Steam Turbine High Temperature application. Material shall be subjected to creep condition.

1. Vendor must have experience of manufacturing and supplying forged/rolled bars of material grade X18CrMoNbVN11 - 1/ X19CrMoNbVN11-1. **Material supplied in hardened and tempered condition only will be considered for experience.**
2. **Minimum experience requirement:**
   Vendor must meet any one of the following experience criteria in grade X18CrMoNbVN11-1/ X19CrMoNbVN11 - 1 on the tender opening date. :

   - Successfully executed at least three orders

   Or

   - Supplied minimum 5 Tons

   Or

   - Executed at least one order and having Creep Rupture data for 1000hrs **or** Creep Properties as per EN10269. Creep Rupture data/ Creep test results has to be submitted with offer.

   In support of above vendor to submit experience details as applicable as per format below:

Sl. No	Name of customer	Purchase order No	Size	Year of supply	Quantity

   As documentary evidence, vendor to submit test certificates covering chemical, mechanical, heat treatment details. The correlation of test certificates with purchase order referred in support of experience has to be ensured by vendor.
3. Vendor must have in-house manufacturing facilities like melting, secondary refining including vacuum degassing, rolling / forging, heat treatment etc. to manufacture round bars as per BHEL specification HW18814 and enquiry size. **Vacuum degassed steel shall be used.**
   Details of the manufacturing facilities like steel melting, secondary refining including vacuum degassing, rolling / forging, heat treatment etc. shall be provided with offer.

   Outsourcing of any of above operation is not acceptable.

   Vendor shall submit following manufacturing details with relevant supporting documents with offer:

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- Steel melting facility including secondary refining & vacuum degassing facility
- Rolling facility - Minimum and maximum dimension which can be rolled (diameter and length)
- Forging facility - Press / Hammer details - Minimum and maximum dimension which can be forged (diameter and length)
- Heat Treatment - Furnace details, quenching media (air, oil, polymer) etc.

4. Vendor to furnish in house testing facilities to carry out testing as per the requirements of BHEL specification HW18814. In case of outsourcing of any test, vendor to agree to carry out testing at Government accredited labs only.

5. Vendor to confirm that they will meet all the requirements of BHEL specification HW18814 with their addendum. Clause wise confirmation to be given with offer.

HEAT RESISTANT STEEL BARS GRADE X18CrMoNbVN11-1 +QT

(Steel Bars ≤ 160 mm diameter or side length for service temperature ≤ 580°C)

1.0 GENERAL :

This specification governs the quality of steel Bars of grade X18CrMoNbVN11-1.

2.0 APPLICATION :

The Bars shall be used for turbine components.

3.0 CONDITION OF DELIVERY:

The bars shall be supplied in the rolled or forged and quenched and tempered condition.

4.0 DIMENSION AND TOLERANCES :

The dimensions and tolerances shall be as per order or order drawing.

5.0 MANUFACTURE :

Degassed, e.g. vacuum degassed steel shall be used. The use of any other steel treatment shall be agreed upon with the purchaser in advance.

6.0 HEAT-TREATMENT:

Hardening: 1100-1130°C /air or oil or comparable polymer

Tempering: 670 – 720°C (min. 2 hours)

If bars need to be straightened after the heat treatment, a stress relieving treatment shall be performed after completion of the entire straightening process. Stress relieving is to be carried out at 20-50°C below the tempering temperature with a subsequent slow cooling rate.

Bundling of bars is allowed only, if the temperature is measured and documented on the outside and within the inner part of the bundle, in order to verify the temperatures. This shall be done during all heat treatment steps.

7.0 CHEMICAL COMPOSITION:

Heat analysis in weight %

Element	C	Si	Mn	P	S	Ni	Cr	Mo	V	Nb	N	Al_{total}	B
Min.	0.17	--	0.30	--	--	0.20	10.0	0.50	0.10	0.25	0.05	--	--
Max.	0.23	0.50	0.80	0.025	0.015	0.50	11.0	0.80	0.30	0.55	0.08	0.015[1]	0.002

[1] A maximum Al-content of 0.010% shall be aimed.

				नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
TSX	B.CHOUDHARY	30/04/11			
STE	D.K.RAY	30.4.11	अनुवादक TRANSLATED BY		
QAX	N.K.MANWANI	30.4.11	निर्माणकर्ता WORKED BY	PANKAJ AGARWAL	25.4.11
PSC	V.K.CHAUHAN	30/4	जांचकर्ता CHECKED BY	ASHSIH RANJAN	25/4/11
सहमत विभाग AGREED DEPTT	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	T S GOPALKRISHNAN	25/4/11

स्वीकृति : संस्थान मानक समिति
APPROVED : PLANT STANDARDS COMMITTEE

Gr.No. 2.60

REV.NO. 01
Dt. 07-11-12

निर्माण : PREPARED : MTE

जारी : मानक विभाग ISSUED : STANDARDS DIVISION

दिनांक : DATE :25.04.2011

8.0 MECHANICAL PROPERTIES:

A hardness test shall be performed to verify the uniformity of the strength within a delivery lot (per melt and heat treatment batch). The test amount shall be 10% of the bars with a minimum of 10 bars. When the lot contains less than 10 bars all bars shall be tested for hardness. The mechanical properties shall be tested on hardest and softest bar.

The specimens are to be taken in longitudinal direction according to EN10269. For bars with diameter (d) or side lengths (a, b) > 100mm, the specimen shall be taken at a distance d/3 respectively a/3 and b/3 from the respective surfaces. In this case, transverse specimens are also allowed. The following properties shall be achieved at room temperature:

Diameter (d)/ side length (a)[1] (mm)	0.2% Proof Strength (N/mm^2)	Tensile Strength (N/mm^2)	Elongation ($l_0 = 5d$) (%)	Reduction of area (%)	Impact Energy[2] (J)	Hardness HB30
d,a ≤ 160	≥ 780	900-1050	≥ 10	≥ 40	≥ 20	270-320

1) The values of the smallest side length (a) shall be reached.
2) Average of 6 Charpy V-notch specimens, minimum value = 16J
   Impact energy test shall be performed on bars having side length ≥ 12 mm or diameter ≥ 16 mm respectively.

9.0 OUTER AND INNER QUALITY/NON DESTRUCTIVE EXAMINATION:

9.1 General:

Cracks, other material separations or more severe linear inclusion lines are only acceptable when located in the dimensional tolerances areas.

9.2 Scope of Inspection:

Following NDE shall be performed in delivery condition:

- verification test of all bars
- Complete ultrasonic inspection (UT) of all bars ≥ 30 mm thickness/diameter according to EN 10308 type 1a-1c (table 1)

9.3 Criteria for registration and decision

Regarding UT inspection quality class 4 according to EN10308 (table 2) shall be applied.

The decision limit for loss of back wall echo is 3 dB for all bar dimensions. Any linear or surface like inhomogenity larger than 10mm in any direction is not acceptable.

This quality requirement applies also for bars having diameter d, a < 30 mm, although it is not necessary to prove this by testing.

10.0 MARKING:

The marking of the material shall be such that heat no., specification no. or grade, heat treatment batch no. & manufacturer name / identification are legible.

11.0 TEST CERTIFICATES:

The supplier shall supply four copies of test certificates as per EN 10204, certificate3.1 B, unless otherwise stated on the order. The test certificates shall bear the following:

- BHEL References:
- Specification no., Purchase orders no.
- Suppliers references,
- Name, emblem, material designation, melt no, Heat-treatment batch no.
- Results of Testing:
- Melting process, melt analysis,
- Hardness Survey results
- Mechanical properties, all individual values shall be reported
- Heat-treatment details,
- If bundle tempering: information on the temperature distribution at the outside and within the inner part of the bundle
- U.T result
- Confirmation of the material identification (mix up) test

12.0 CLEARANCE FOR DELIVERY:

The total results of the tests carried out are the deciding factor for clearance for delivery. BHEL shall evaluate the total results taking into consideration the intended use of the material and examines accordingly the permissibility of deviation (if any) from the specified properties.

The clearance however does not relieve the supplier of his responsibility for the hidden non-permissible defects, which are found later.

13.0 CROSS REFFERED STANDARDS:

EN10204, EN10269, EN 10308

Addendum to Specification HW18814

(Material Grade: X18CrMoNbVN11-1+QT)

PRODUCT AND PROCESS QUALFICATION:

1.0 General:

Product and process qualification procedures are required for first order. The product and process qualification is required for each of the manufacturer's fabrication facility.

Depending on the complexity of the product and / or process and experience from the first orders, requirement of additional process qualification in subsequent orders shall be reviewed by BHEL.

Prior to the start of manufacture, the manufacturer has to submit a manufacturing and testing plan to BHEL in which the quality assured process workflow, i.e. the sequence of process activities (manufacturing, testing and inspection steps) are specified in chronological order.

BHEL must be informed for any change in manufacturing and testing processes. Depending on the type and scope and thus the significance of any given change, BHEL will decide whether it is necessary to requalify the product and/or process.

Subcontracting of process steps to sub suppliers is only acceptable after written approval from BHEL.

1.1 The following additional tests have to be performed during qualification:

1.1.1 Tensile tests at elevated temperature:

In accordance with EN 10002-5 a tensile test in longitudinal direction has to be performed at 550°C. Following properties must be achieved:

0.2% Proof Stress	≥ 475 Mpa,
Tensile Strength	≥ 520 MPa,
Elongation (l_0=5d)	≥ 16%
Reduction in area	≥ 55%

In accordance with EN 10002-5 a tensile test in longitudinal direction has to be performed at 600°C. Following properties must be achieved:

0.2% Proof Stress	≥ 395 Mpa,
Tensile Strength	≥ 425 MPa,
Elongation (l_0=5d)	≥ 18%
Reduction in area	≥ 60%

1.1.2 Microstructure Examination

The homogeneity of the microstructure has to be checked and documented by micro section. The microstructure must be uniform and free from porosity, excessive segregation and other in homogeneities.

Delta ferrite content > 5% is not acceptable.

The inclusion content has to be determined in accordance with ASTM E 45.

The grain size must be measured after all heat treatments have been performed in accordance with ASTM E 112 or ISO 643. Grain size 4 or finer must be achieved. A deviation from the average grain size of more than 2 grain sizes is not permissible.

2.0 Cross Referred Standards:

1. EN 10002-5
2. ASTM E112
3. ISO 643
4. ASTM E-45

18/1/12

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18/01/12

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ANNEXURE-VI

Quality Requirements-

- Vendor to submit quality plan in the enclosed format, along with offers for BHEL approval. Refer annexure-V for quality plan format.

- Inspection by TPI (LRS/TUV/BV) for import and BHEL nominated agency 'TUV' for indigenous as per BHEL approved Quality Plan.

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ANNEXURE-VII

(Quality Plan Format)

MANUFACTURER'S NAME AND ADDRESS			STANDARD QUALITY PLAN			TO BE FILLED BY BHEL	TO BE FILLED BY BHEL
BHEL	VENDOR'S NAME	ITEM		QP NO.			
				DATED			
		DRG. NO.	AS PER PO				
		SPEC.	AS PER PO				
		REV		Page 1 of 1			

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS		AGENCY			REMARKS
										M	B	N	
1	2	3	4	5	6	7	8	9	D	10			11

		LEGEND: ! RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION. M: MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N: CUSTOMER INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION	FOR CUSTOMER USE	
MANUFACTURER/SUBCONTRACTOR		ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER		APPROVED BY