



BHARAT HEAVY ELECTRICALS LIMITED
HEEP HARIDWAR INDIA-PIN 249403
FAX NO: 0091 1334 226462
PHONE NO: 0091 1334 281561

Eng. No. : T/3990/2017/5615/K

M/s.....

Sub: BHEL-HEEP/OPEN-TENDER (Turbine Component) / 2018

Dear Sir,

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

Sealed tenders with the **Tender No.** and **opening date** clearly super scribed on the cover are invited from the manufacturers (registered as well as unregistered) for the supply of the following items :-

SL. NO.	MATERIAL CODE	DESCRIPTION	SPECIFICATION NO.	QTY(KG)	DELIVERY SCHEDULE
1	HW1060387026	Heat Resistant Steel Bars, Size 34X22	HW10687 REV:08	1700.00	31.08.2018
2	HW1060387123	Heat Resistant Steel Bars, Size 82X46	HW10687 REV:08	6400.00	01.06.2018(1800KG) 31.08.2018(4600KG)
3	HW1060387131	Heat Resistant Steel Bars, Size 80X50	HW10687 REV:08	2500.00	31.08.2018
4	HW1060387140	Heat Resistant Steel Bars, Size 86X55	HW10687 REV:08	5100.00	01.06.2018(1100KG) 31.08.2018(4000KG)
5	HW1060387387	Heat Resistant Steel Bars, Size 80X43	HW10687 REV:08	1900.00	01.06.2018
6	HW1060387492	Heat Resistant Steel Bars, Size 75X46	HW10687 REV:08	9200.00	31.08.2018
7	HW1060387522	Heat Resistant Steel Bars, Size 98X51	HW10687 REV:08	2600.00	01.06.2018(1000KG) 31.08.2018(1600KG)
8	HW1060387530	Heat Resistant Steel Bars, Size 94X58	HW10687 REV:08	14300.00	01.07.2018(4900KG) 01.08.2018(4900KG) 31.08.2018(4500KG)
9	HW1060387573	Heat Resistant Steel Bars, Size 94X48	HW10687 REV:08	7520.00	01.07.2018(1160KG) 01.08.2018(1160KG) 31.08.2018(5200KG)
10	HW1060387590	Heat Resistant Steel Bars, Size 107X62	HW10687 REV:08	11200.00	01.07.2018(4200KG) 01.08.2018(4200KG) 31.08.2018(2800KG)
11	HW1060387611	Heat Resistant Steel Bars, Size 97X55	HW10687 REV:08	12400.00	01.06.2018(4200KG) 01.07.2018(4100KG) 01.08.2018(4100KG)
12	HW1060387620	Heat Resistant Steel Bars, Size 98X60	HW10687 REV:08	15900.00	01.06.2018(2500KG) 01.07.2018(4800KG) 01.08.2018(4800KG) 31.08.2018(3800KG)
13	HW1060387646	Heat Resistant Steel Bars, Size 94X50	HW10687 REV:08	2400.00	31.08.2018
14	HW1060387654	Heat Resistant Steel Bars, Size 92X52	HW10687 REV:08	2200.00	01.06.2018

15	HW1060387697	Heat Resistant Steel Bars, Size 110X70	HW10687 REV:08	3000.00	31.08.2018
16	HW1060387166	Heat Resistant Steel Bars, Size 106X70	HW10687 REV:08	5800.00	01.07.2018(2900KG) 01.08.2018(2900KG)
17	HW1060387506	Heat Resistant Steel Bars, Size 90X57	HW10687 REV:08	3800.00	01.07.2018(1900KG) 01.08.2018(1900KG)
18	HW1060387549	Heat Resistant Steel Bars, Size 87X48	HW10687 REV:08	9600.00	01.07.2018(4800KG) 01.08.2018(4800KG)
19	HW1060387565	Heat Resistant Steel Bars, Size 72X42	HW10687 REV:08	2000.00	01.07.2018(1000KG) 01.08.2018(1000KG)
20	HW1060387581	Heat Resistant Steel Bars, Size 100X60	HW10687 REV:08	10400.00	01.07.2018(5200KG) 01.08.2018(5200KG)
21	HW1060387603	Heat Resistant Steel Bars, Size 92X50	HW10687 REV:08	3520.00	01.07.2018(1760KG) 01.08.2018(1760KG)

SPECIAL INSTRUCTIONS:

- VENDOR TO OFFER AS PER SPECIFICATION (Annexure-1) HERE ENCLSD.
- BHEL STANDARD PAYMENT TERM i.e “PAYMENT AFTER RECEIPT AND ACCEPTANCE OF MATERIAL/ITEM AT HEEP, BHEL-STORE” AS **PER GENERAL INSTRUCTION AND STANDARD TERMS & CONDITION (GISTC),VERSION JUNE 2017, Rev:01** SHALL BE APPLICABLE.
- THE QUOTATION SHALL BE VALID FOR A **MINIMUM PERIOD OF 120 DAYS**, EFFECTIVE FROM THE DATE OF TENDER OPENING.
- VENDOR TO CONFIRM THAT THEIR QUOTED RATES ARE NOT MORE THAN THOSE QUOTED FOR ANY OTHER CUSTOMER INCLUDING OTHER BHEL UNITS.
- End of bars should be squared and sawed off properly .
- There should be proper stamping of cross section, Heat number, material grade vendor code/vendor name on each bar at the pitch of one meter.
- Quantity tolerance should be (+/-10) %.
- Date of BL/GR will be treated as date of delivery for all purposes including penalty for Late Delivery. In case, vendor quotes date of final inspection as date of delivery then date of BL/GR should be between 15 days of date of final inspection otherwise penalty for late delivery would be applicable.
- Foreign vendors to either quote third party inspection charges (LRS/BV/TUV) separately in their offer or vendor to mention that third party inspection charges are included in the quoted prices of the offer. If vendor do not quote third party inspection charges or not mention that third party inspection charges are included in quoted prices, then it shall be presumed that third party inspection charges are included in the quoted prices of the offer. No further clarification shall be asked in this regard after opening of techno-commercial bid part-1.
- All vendors to submit test certificates and guarantee certificate.
- All vendors to furnish quality plan along with offer in the enclosed format (Annexure-3) for our review and approval.
- Inspection by third party (LRS/TUV/BV) for foreign vendors and BHEL nominated agency 'TUV' for indigenous vendors as per approved quality plan.
Scope of inspection agency shall be as follows:-
-Witnessing of hardness test, process qualification, mechanical testing, metallographic testing, NDT, material identity test, visual & dimensional checking and review of remaining TCs as per ordering specification/documents.
- Late delivery penalty will be applicable @ 0.5% per week or part thereof subject to maximum of 10% of unexecuted portion of the order. The remaining terms shall be as per **GENERAL INSTRUCTION AND STANDARD TERMS & CONDITION (GISTC),VERSION JUNE 2017, Rev:01**
- EARLY DELIVERY IS ALSO ACCEPTABLE. VENDOR TO OFFER BEST DELIVERY SCHEDULE.
- THE TOTAL QUANTITY MAY UNDERGO CHANGE AT THE TIME OF ORDERING.

The tender documents can be downloaded from our web site www.bhel.com or www.bhelhwr.co.in or www.tenders.gov.in. After downloading the tender documents from web site, while submitting the tender as detailed in “Instruction to Bidders”, intending vendors must submit **Tender Fee of Rs. 2,000/- (Rupees two thousand only)** in the form of Pay Order / Demand Draft (drawn in favor of ‘BHEL HARIDWAR’) only. It may be noted that if hard copy of any tender document is required, then the same may be collected against copy of Pay Order / Demand Draft of requisite tender fee (while original to be submitted with Part-I). **However, if no hard copy of any tender document is required from BHEL, no tender fee is required to be submitted.**

Vendors must also remit the **requisite EMD (Earnest Money Deposit) of Rs. 2, 00,000/- (Rupees two lakhs only)** in the form of Pay Order / Demand draft (drawn in favor of ‘BHEL HARIDWAR’). In case of foreign bidders e-payment may also be accepted as EMD. **If EMD is not submitted along with the offer (Part-I) then the offer shall be out rightly rejected.**

HEEP BHEL Hardwar PMD: SL008 approved vendors 82012,72519,72518,41431,21181 & 06068 for all material codes are exempted for submission of requisite EMD against this tender enquiry.

Please submit separate drafts for EMD and tender fee in an envelope super-scribed with bold letters “EMD & Tender Fee” to be submitted with Part-I.

As per notification reference no. NSIC/HO/GP/15(4)/2013-14 dated 07.07.2013 Micro & Small Enterprises (MSEs) are not required to submit EMD & tender fee subjected to comply the following instruction:

As per GOI (Ministry of Finance) Office Memorandum dated 28th Feb-2018 it is mandatory from 01-04-2018 to register the Udyog Adhar Memorandum (UAM) of all MSME vendors on Central Public Procurement Portal (CPPP), failing which such MSME bidders shall not be able to avail the benefits available to MSEs as contained in Public Procurement Policy for MSEs Order-2012. All the MSME Vendors are advised to comply the same and confirmation for this should be mentioned in their offer / bids mandatorily.

BHEL will forfeit the EMD if, the successful bidder / vendor refuses to honor the order after award of the same on him and / or withdraws his bid and / or unilaterally changes the offer and / or any of its terms & conditions within the validity period.

Tenders will be received in Tender Box kept in Tender Room and should be addressed to:

**THE HEAD OF MATERIAL MANAGEMENT,
Heavy Electrical Equipment Plant,
Bharat Heavy Electricals Limited,
HARIDWAR-249403 (Uttarakhand), INDIA.**

The date for opening of tender shall be 14.05.2018. Tenders will be received up to 1.45 P.M. on 14.05.2018 and opened on the same day at 2.00 P.M. in the Tender Room. **Please note that tender received after due date & time (1.45PM on 14.05.2018) will not be REPEAT will not be opened.** BHEL will not be responsible for any type of postal / courier delay.

Bids shall be opened at 2 PM on the due date in the presence of authorized representative of the bidders who may like to be present. The authorized representative should bring authority letter from their parent company (Manufacturer) for the specific tender no. attending the bid opening.

Amendments/Corrigendum, if any, will be hosted only on the websites mentioned above. Other terms and conditions will be as per tender documents.

Foreign and Indigenous bidders against open tender will necessarily have to obtain class – III DSCs. Procedure for application is available on www.bhel.com.

Documents submitted with the offer/bid by the bidder (original supplier) shall be signed and stamped in each page by authorized representative of the bidder. Documents not signed and stamped in each page by the authorized signatory of the bidder, shall neither be accepted nor considered for evaluation of the bid.

Vendors operating from BHEL quarters, unauthorized colonies on BHEL land and Dharamshalas/ hotels shall not be considered, hence such vendors need not apply. Any vendor who is under hold (for the item)/ delisted/ banned with BHEL on date of opening of Part – 1 will not be allowed to quote for this tender. In case their offer is received, it may be out rightly rejected.

Please submit your offer only for the above requirement subject to our **GENERAL INSTRUCTIONS AND STANDARD TERMS & CONDITIONS (GISTC), Version June 2017, Rev: 01**. Please visit our site www.bhelhwr.co.in for **General Instructions and Standard Terms & Conditions (GISTC), Version June 2017, Rev: 01** for Tender Enquiries. All the bidders/vendors must ensure compliance of these GISTC.

Unregistered vendors may please visit our site www.bhel.com for filing up the Supplier Registration Form. Copy of filled Supplier Registration Form (SRF) may be submitted along with the offer.

KINDLY READ "INSTRUCTIONS TO BIDDERS." QUOTATION NOT IN ACCORDANCE WITH THE INSTRUCTIONS ARE LIABLE TO BE DISQUALIFIED AND IGNORED.

INSTRUCTIONS TO BIDDERS FOR OPEN TENDER

Definition

Registered Vendors - Are those who are registered with BHEL, Haridwar for Megawatt rating/ Size/ Weight of tendered items in respective material grade or machining of such items.

Un-registered Vendors - Are those who are not registered with BHEL, Haridwar for Megawatt rating/ Size/ Weight of tendered items in respective material grade or machining of such items.

ESSENTIAL INSTRUCTIONS

* Un-registered vendors may be approved by BHEL, if found suitable, on the basis of data furnished by them in Supplier Registration Form (SRF) for Foreign Vendors or Indigenous Vendors (as applicable).

* BHEL team may visit the vendor (s) works for verification of capability and capacity claimed in tender Documents/offer (s).

* The tenders shall be submitted in **two parts** in separate sub-envelopes clearly super scribing type of bid, tender no., due date and the name of vendor with full contact details.

Part I –

- Tender fee (if hard copy insisted from BHEL) & EMD
- Duly filled Non Disclosure Agreement (Annexure 4)
- Point wise reply/confirmation to **Pre-qualifying requirement (PQR)** as per Annexure-2A & 2B along with all necessary supporting documents in one go.
Noncompliance of this may lead to rejection offer.
- Techno- Commercial Bid - it should be replica of price bid (copy of price bid without price part) in line with technical requirement as per specification. (Annexure-1).
- Quality plan format (Annexure-3)

Part-II -

- Price Bid

All the sub-envelopes (Part-I & Part-II) to be put in a single covering envelope indicating tender no., due date and the name of vendor, e-mail id, with full contact details. Offer should be complete in all respect (i.e. Part-I & Part- II). BHEL may decide to ignore the offer in case of submission of incomplete offer

* Please submit your offer according to **General Instructions and Standard Terms & Conditions (GISTC), Version: June 2017 Rev: 01** for Tender Enquiries. Please visit our site **www.bhelhwr.co.in** for **GISTC**. All the bidders/vendors must ensure compliance of these **GISTC (VERSION: June-17, REV. 01)**. **GISTC (VERSION: June- 17, REV. 01)** can also be referred by login to B2B Portal for Vendors.

REFERENCES:

Annexure-1 (Applicable specification HW10687 Rev08)

Annexure-2A & 2B (Pre-Qualification Requirement)

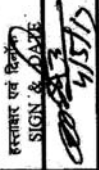
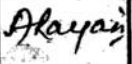
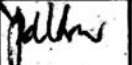
Annexure-3 (Quality Plan)

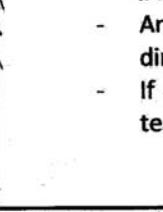
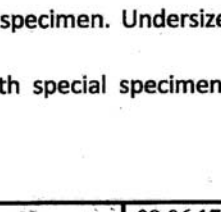
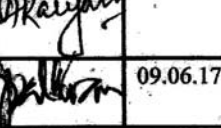
Annexure-4 (NDA)

हस्ताक्षर एवं दिनांक SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हरिद्वार)		HW 10687
		PLANT PURCHASE SPECIFICATION (HEEP - HARIDWAR)		मुख्य पृष्ठ PREFACE SHEET
SUPERSEDES INVENTORY NO.		HEAT RESISTANT STEEL BARS FOR TURBINE BLADES GRADE: X22CrMoV121 +QT2 केवल आंतरिक प्रयोग हेतु प्रदायक को देने से पूर्व मुख्य पृष्ठ को निकाल दें FOR INTERNAL USE ONLY REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS.		
सामग्री सूची संख्या को अधिकृतित करना है		समतुल्य मानक सूची आदि / COMPARABLE STANDARDS / CATALOGUES ETC.		
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company		सुझाए सम्भावित प्रदायक एवं श्रेणी / SUGGESTED / PROBABLE SUPPLIERS AND GRADES. } : As Per PMD		
स्वत्वाधिकार एवं गोपनीय : यस प्रत्येक में ही मई सूचना भारत भारती हस्तक्षेपक की सम्पत्ति है इसका प्रकाश एवं अन्यथा इस से किसी भी तरह प्रयोग, जो कि सम्पत्ति के हित में हानिकारक हो ना किया जाय		कोई अन्य जानकारी ANY OTHER INFORMATION } : Based on TLV9248, 06, Dec'2013		
हस्ताक्षर एवं दिनांक SIGN & DATE		स्वीकृति : संस्थान मानक समिति. APPROVED : PLANT STANDARDS COMMITTEE		
सामग्री सूची संख्या INVENTORY NO.	P-2006	REV: 108	निर्माण PREPARED: MTE	जारी : मानक विभाग ISSUED: STANDARDS DIVISION
		DI-14-8-17		दिनांक DATE 31-12-1989
				Gr. No. 2.60

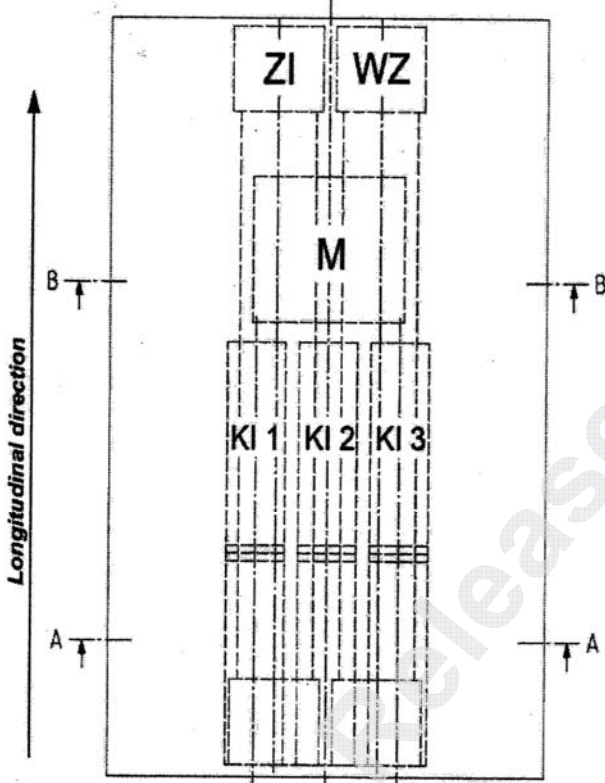
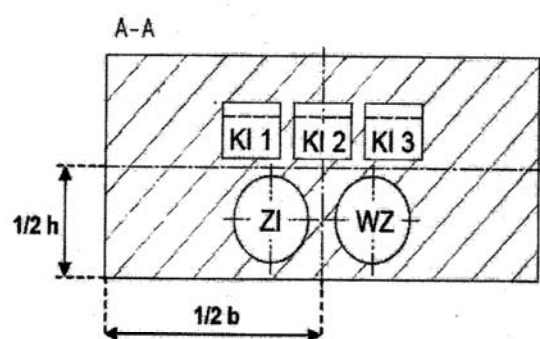
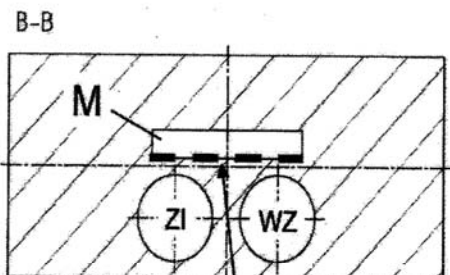
दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप : हरिद्वार)		HW10687	
		PLANT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		पृष्ठ का Page 1 of 8	
सुपरसेड्स INVENTORY NO.	माली सूची संख्या की अवधि का है	HEAT RESISTANT STEEL BARS FOR TURBINE BLADES GRADE: X22CrMoV121 +QT2			
TLV9248/06, Dec '13		1.0 General: This specification governs the quality of Steel rectangular bars in steel grade X22CrMoV121, material no. 1.4923 EN10269. 2.0 Application: For machining of blades for Steam Turbine. 3.0 Condition of Delivery: Rolled or Forged and Heat Treated. 4.0 Dimension and Tolerances: Dimensional tolerance, straightness, twisting and bulging limits shall be as per HW0993008. 5.0 Manufacture: Degassed steel (e.g. vacuum degassed) shall be used. Cast ingot is to be used as initial material for production of the bars. The manufacturing process must ensure a homogenous grain structure over the entire length of the bar and the bar cross section. 6.0 General Requirements: - Prerequisite requirement for approval of a new vendor is a successful Process qualification. Manufacturing process established during this shall be the basis for future manufacture. Manufacturing plan shall be prepared and submitted after successful process qualification. Manufacturing plan shall include specific information on manufacturing like rolling temperature, reduction ratio, heat treatment temperature, hardening method and soaking time, rate of heating and cooling etc. Test instructions for nondestructive and destructive testing are to be provided in the manufacturing and testing plan. - Product and process qualification is mandatory for each of the supplier's manufacturing plants. - For new supplier, process qualification shall be required for three purchase orders. - If necessary, BHEL may ask for process qualification for verification of manufacturing reliability from regular suppliers also. - Any change in the agreed manufacturing plan shall be informed to BHEL. BHEL will review the requirement of renewed process qualification.			
COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.		स्वत्वधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती उपकरणों लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण के बिना की जाने वाली है। इससे किसी भी प्रकार का नुकसान होना नहीं चाहिए।			
दिनांक एवं हस्ताक्षर SIGN & DATE	माली सूची संख्या INVENTORY NO.	TSX PSC QAX STE सहमत विभाग AGREED DEPTT. नाम NAME दिनांक एवं हस्ताक्षर DATE & SIGNATURE			
		नाम NAME दिनांक एवं हस्ताक्षर SIGNATURE & DATE			
		अनुवादक TRANSLATED BY कार्यकर्ता WORKED BY मानकरी CHECKED BY पर्यवेक्षणकर्ता SUPERVISED BY			
		ASHISH RANJAN ASHISH RANJAN GOPAL KRISHNAN			
		स्वीकृति संस्थान मानकीकरण समिति APPROVED : PLANT STANDARDIZATION COMMITTEE Gr. NO. 2.60			
		निमर्षण PREPARED : MTE जारी ISSUED : TSX दिनांक DATE : 31.12.1985			
		REV.NO. 08 Dt. 14/12/17 CHANGE ADVICE NO. TSX(MTE)-17-38			

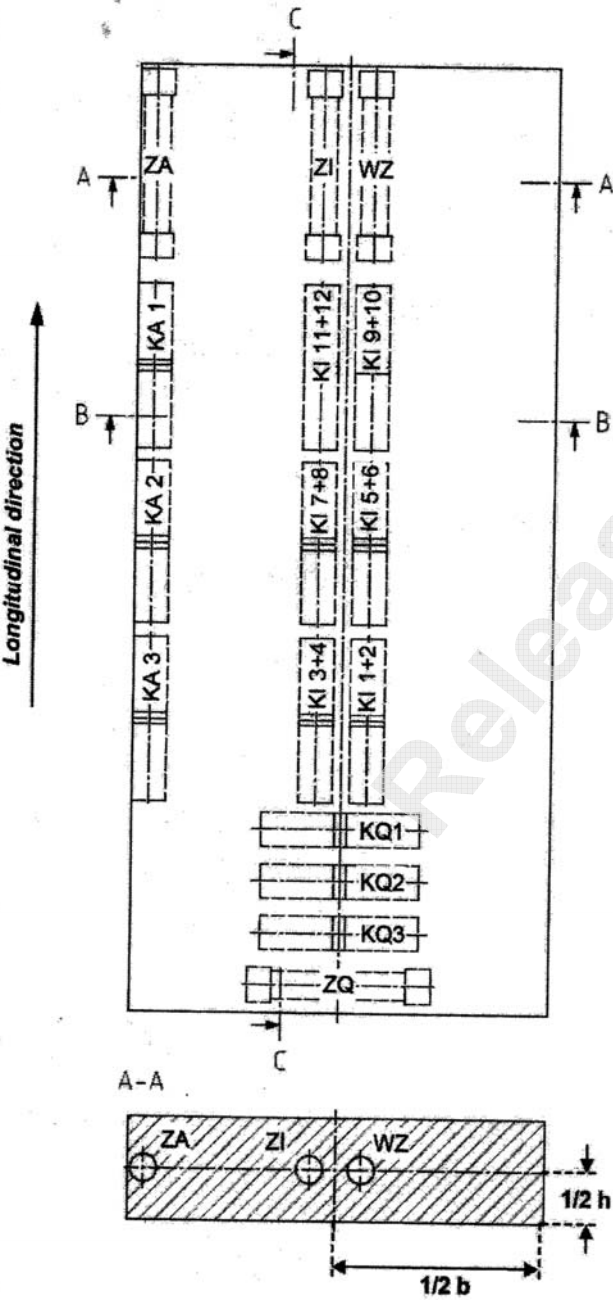
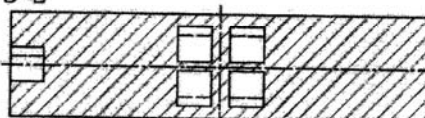
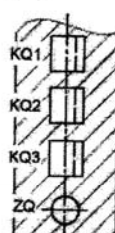
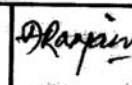
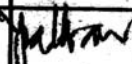
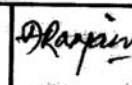
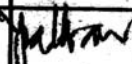
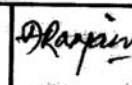
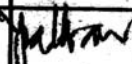
हस्ताक्षर एवं दिनांक SIGN & DATE सामग्री सूची संख्या को INVENTORY NO.		संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARIDWAR)		HW 10687 पृष्ठ 2 का 2 of 8																			
हस्ताक्षर एवं दिनांक SIGN & DATE सामग्री सूची संख्या को INVENTORY NO.		7.0 Heat Treatment: Hardening has to be done in accordance with EN 10269 + QT2 in line with Table B .1 (1020 - 1070°C /air or liquid quenching). Tempering must be done at a temperature ≥ 650°C. A fully transformed and tempered martensitic microstructure must be present over the entire cross section. Hardening and tempering in bundles are not allowed. Suitable gaps between two bars are to be ensured during heat treatment for uniformity of properties. If bars need to be straightened after the heat treatment, a stress relieving heat treatment shall be performed after completion of entire straightening process. Stress relieving is to be carried out at 20 - 30°C below the tempering temperature with a subsequent slow cooling. The lowest possible residual stresses shall be targeted. Distortion of the finish machined part due to residual stresses from the manufacturing process or heat treatment process shall not occur.																					
हस्ताक्षर एवं दिनांक SIGN & DATE सामग्री सूची संख्या को INVENTORY NO.		8.0 Properties and their verification: 8.1 Chemical Composition: Heat analysis in weight %<table><tr><td>C</td><td>Si</td><td>Mn</td><td>P</td><td>S</td><td>Cr</td><td>Mo</td></tr><tr><td>0.18 - 0.24</td><td>0.10 - 0.50</td><td>0.30 - 0.80</td><td>≤ 0.020</td><td>≤ 0.020</td><td>11.0 - 12.5</td><td>0.80 - 1.20</td></tr></table><table><tr><td>Ni</td><td>V</td></tr><tr><td>0.30 - 0.80</td><td>0.25 - 0.35</td></tr></table>				C	Si	Mn	P	S	Cr	Mo	0.18 - 0.24	0.10 - 0.50	0.30 - 0.80	≤ 0.020	≤ 0.020	11.0 - 12.5	0.80 - 1.20	Ni	V	0.30 - 0.80	0.25 - 0.35
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हस्ताक्षर एवं दिनांक SIGN & DATE सामग्री सूची संख्या को INVENTORY NO.		8.2 Properties and Microstructure: The specimens shall be taken in the longitudinal direction in accordance with Attachment 1. The properties described below shall be determined at room temperature in the delivery condition, i. e. after the last heat treatment including any stress relieving heat treatment. The metallographic investigations shall be performed on the hardest and softest bar with an area of at least 320mm² each. The areas to be investigated must be in the longitudinal direction. The longitudinal direction must be indicated in the documentation. 8.2.1 Mechanical Properties: Hardness of the bars in a test unit shall be verified by Brinell hardness testing in accordance with ISO 6506 -1, HBW10/3000 or HBW 5/750 may be used. The surface of the bar shall be prepared in the area of the hardness measurement so that the result is not affected by the surface condition																					
हस्ताक्षर एवं दिनांक SIGN & DATE सामग्री सूची संख्या को INVENTORY NO.		निर्माणकर्ता WORKED BY जांचकर्ता CHECKED BY Ashish Ranjan Gopal Krishnan 02.05.17 02.05.17																					

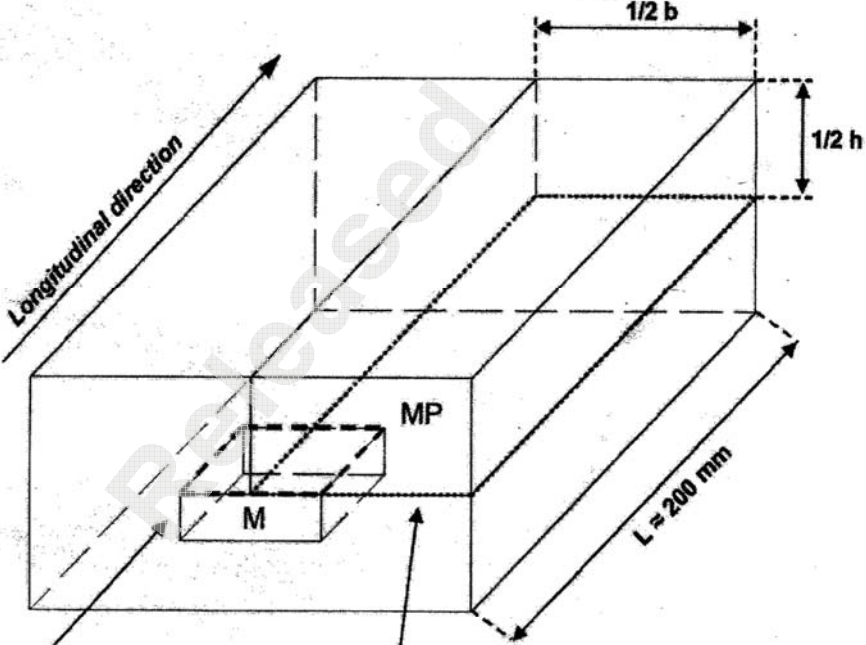
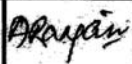
हस्ताक्षर एवं दिनांक SIGN & DATE			संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARIDWAR)		HW 10687 पृष्ठ का Page 3 of 8													
समूची सूची संख्या INVENTORY NO.		SUPERSEDES INVENTORY NO. सामग्री सूची संख्या को प्रतिस्थापित करता है	Hardness testing shall be performed on 10% of each test unit but at least on 10 bars or on each bar if test unit is less than 10 bars. The greatest resulting difference in hardness shall not exceed 35HBW. Mechanical properties shall be determined on the hardest and softest bar determined in a test unit. Tensile testing shall be performed in accordance with ISO 6892 -1 or ASTM E8M (round specimen with $L_0 = 50\text{mm}$ and $d_0 = 10\text{mm}$) or ASTM E8M (standard specimen in accordance with figure 8). Standard specimens Charpy (V-notch) in accordance with ISO 148 -1 shall be used for determining the absorbed impact energy. The following properties must be achieved at room temperature: <table border="1" data-bbox="305 619 1409 808"> <thead> <tr> <th>0.2 % Proof Stress (N/mm²)</th> <th>Tensile Strength (N/mm²)</th> <th>Elongation After Fracture (%)</th> <th>Reduction in area %</th> <th>Impact Energy (J)¹</th> <th>Hardness HBW</th> </tr> </thead> <tbody> <tr> <td>≥ 700</td> <td>900 - 1050</td> <td>≥ 11</td> <td>≥ 35</td> <td>≥ 20</td> <td>265 - 310</td> </tr> </tbody> </table> ¹ Average of 3 specimens and minimum value for two specimens in accordance with EN10021, where the lowest value shall be at least 14 Joule. 8.2.2 Microstructure: Microstructure must be uniform, without porosity, excessive segregation or other inhomogeneities. 8.2.2.1 Cleanliness: The cleanliness shall be determined as per ASTM E45 method A. Acceptance criteria: <u>Inclusion: Thin Series</u> Type A, B, C: 2 max Type D: 2.5max <u>Inclusions: Heavy Series</u> Type A, B, C, D: 1.5max Maximum Number and dimension of globular inclusions (type D) $IR(D) = n_1 + 2.5n_2$, IR (D) is converted to an area of 160mm² $IR(D) \leq 10$ n = number of globular inclusions n_1 (25-50 μm); n_2 (51-75 μm) Any material discontinuities present at the inclusion must also be accounted for in determining the size of the globular inclusion. Inclusions > 75 μm, including any material discontinuities are not allowable. 8.2.2.2 Delta Ferrite content and grain size: - Delta ferrite content shall be < 5%. The determination of delta ferrite content shall be performed based on analysis methods in accordance with ASTM E45 Method A, "Worst field method" with $V=100:1$. - An average grain size of 4 or finer has to be achieved. Grain size shall be determined on the martensitic secondary grain structure in accordance with ASTM E112 or ISO643. A deviation of more than 2 grain sizes in size of individual's grains from the average grain size is not allowable.				0.2 % Proof Stress (N/mm ²)	Tensile Strength (N/mm ²)	Elongation After Fracture (%)	Reduction in area %	Impact Energy (J) ¹	Hardness HBW	≥ 700	900 - 1050	≥ 11	≥ 35	≥ 20	265 - 310
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	स्वतंत्रताधिकार एवं गोपनीयता इस दस्तावेज़ में दी गई सूचना भारत की स्वतंत्रता, अखंडता, एकता, एकता एवं अखंडता को सुरक्षित रखने के लिए है। इस दस्तावेज़ को बिना अनुमति के किसी भी तरह प्रकाशित, प्रसारित, या किसी भी रूप में प्रसारित नहीं किया जा सकता है।																	
हस्ताक्षर एवं दिनांक SIGN & DATE 																		
सामग्री सूची संख्या INVENTORY NO. P-2006		REV 08	निर्माणकर्ता WORKED BY Ashish Ranjan 	जांचकर्ता CHECKED BY Gopal Krishnan 	02.05.17 02.05.17													

हस्ताक्षर एवं दिनांक SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARIDWAR)		HW 10687 पृष्ठ का Page 4 of 8									
SUPERSEDES INVENTORY NO.		8.3 Non-destructive Testing: 8.3.1 Test Scope: The following Non-destructive inspection shall be performed in the as delivered condition: - Visual inspection of all bars - Ultrasonic examination of all bars in accordance with TWP1204. 100% of the volume must be tested in accordance with the recording level. 8.3.2 Recording level and acceptance criteria: - Indications of surface defects such as rolled marks shall be ground out to investigate their depth at least at both ends, in the middle of the indication and at an interval of approx. 250mm. - Surface defects with a depth extension of $\geq 1\text{mm}$ are not allowable, and these areas shall be cut out of the bar. - Ultrasonic examination of all bars in accordance with TWP 1204. - Defects above the recording level are not acceptable. - It shall be confirmed in writing to the BHEL that bar sections containing defects above the recording level have been cut out of the bar. - The acceptance of material at vendor's works does not relieve the supplier of his responsibility for defects discovered at later stages. 8.3.3 Material Identity Test: An identity test must be conducted in the as – delivered condition on all bars.											
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company		9.0 Process Qualification: In addition to testing as per clause 8.0 of this specification, following additional testing shall be performed in process qualification (see Attachment 2). All test results carried out during process qualification shall be submitted to BHEL for approval. - Tensile tests¹: The strength values (0.2% Proof Stress and Tensile Strength) in the transverse direction (specimen orientation ZQ) shall not differ by more than 10% from the corresponding longitudinal values. - The absorbed impact energy in the transverse direction (KQ 1 -3) should not differ by more than 25% from the values in the longitudinal direction (KI at room temperature). - FATT: Determination of FATT (fracture appearance transition temperature) in accordance with ASTM A370. The FATT should be preferably evaluated based on SEP 1670 (software) method. The test scope must include at least 10 specimens. FATT < 25°C is to be achieved. In accordance with ISO 6892 -2, a tensile test (in longitudinal direction) has to be performed at 600°C. The following properties must be achieved: <table border="1" data-bbox="324 1375 1388 1501"> <thead> <tr> <th>0.2 % Proof Stress (N/mm²)</th> <th>Tensile Strength (N/mm²)</th> <th>Elongation After Fracture (%)</th> <th>Reduction in area (%)</th> </tr> </thead> <tbody> <tr> <td>≥ 285</td> <td>≥ 380</td> <td>≥ 18</td> <td>≥ 60</td> </tr> </tbody> </table>				0.2 % Proof Stress (N/mm ²)	Tensile Strength (N/mm ²)	Elongation After Fracture (%)	Reduction in area (%)	≥ 285	≥ 380	≥ 18	≥ 60
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स्वत्वाधिकार एवं गोपनीय : यस दस्तावेज में दी गई सूचना भारत भारती इलेक्ट्रिकल्स की संपत्ति है इसका प्रयोग एवं प्रकाशन के बिना भारत भारती इलेक्ट्रिकल्स की अनुमति के बिना नहीं किया जा सकता है।		1 For case where standard specimens in transverse direction cannot be made: - - For tensile test specimens, a round specimen with $L_0 = 5 d_0$ or a flat specimen with a proportionality factor of $k= 5.65$. Proportional specimens in accordance with Fig 8 shall be used if ASTM E8 is applied. - An undersized specimen in accordance with ISO 148 -1 for impact test specimen. Undersize dimension to be reported. - If dimension do not allow testing in the transverse direction, even with special specimen, testing will be carried out in the longitudinal direction only.											
हस्ताक्षर एवं दिनांक SIGN & DATE		REV 08 (SUPERSEDES)	निर्माणकर्ता WORKED BY	Ashish Ranjan	 09.06.17								
सामग्री सूची संख्या INVENTORY	P-2006		जांचकर्ता CHECKED BY	Gopal Krishnan	 09.06.17								

हस्ताक्षर एवं दिनांक SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARIDWAR)	HW 10687 पृष्ठ का Page 5 of 8	
सुपरसेड्स INVENTORY NO.	सामग्री सूची संख्या को अतिरिक्तित्व करता है	Intergranular Fracture: The fraction of Intergranular fracture shall be determined over the entire brittle fracture portion of the fracture surface of the impact test specimens tested at room temperature. The fraction of Intergranular fracture shall not exceed 10%. This test is not required for materials which indicate $\geq 90\%$ ductile fracture at room temperature. Magnetic Particle Test: Performance of MT testing by the magnetic flux leakage method, alternating current phase shifted and a field strength of 20 – 65A/cm. Distribution, type and size of grain structure in-homogeneities (e.g. segregation or delta ferrite) shall not result in MT indications. 10.0 Identification Marking: All bars are to be marked with following information: - Purchase Order Number - Size - Material Grade - Supplier Identification The details are to be clearly stamped and encircled by oil paint. Each bar shall be painted with gold colour on both ends. All the bars shall be suitably packed to protect them against corrosion and damage during transportation. Bars having maximum and minimum hardness (from which test samples are taken) shall be clearly marked by oil paint for easy identification. Their respective hardness values shall also be punched on these bars. 11.0 Documentation: Prior to, but in no case later than the delivery of the material, an inspection certificate as per EN 10204 shall be provided to BHEL in duplicate; this certificate must contain the following data: (a) Material code no and P.O. number (b) Material designation (c) Heat no., heat analysis and melting methods (d) Complete information on all heat treatments performed (e) Mechanical test results including hardness range and the metallurgical examination. (f) Results of non-destructive tests, UT inspection report (g) Confirmation of the material identity check (g) Confirmation of the dimensions and visual inspection 12.0 Cross Referred Standards: EN10269, HW0993008, ISO 6506-1, ISO 6892, ISO 148-1, ASTM E8M, EN10021, ASTM E45, ASTM E112, ISO 643, TWP1204, ASTM A370, SEP1670, EN10204 13.0 Modification with respect to last revision: • Clause 8.3 modified.		
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	स्वतन्त्राधिकार एवं गोपनीय ; यस परेख में दी गई सूचना भारत भारती भारतीभारत की संपत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि व्यक्तियों के हित में हानिकारक हो या किया जाए			
हस्ताक्षर एवं दिनांक SIGN & DATE				
सामग्री सूची संख्या INVENTORY NO.	REV 08 (SUPERSEDES)	निर्माणकर्ता WORKED BY	Ashish Ranjan	09.06.17
1-20096		जांचकर्ता CHECKED BY	Gopal Krishnan	09.06.17

हस्ताक्षर एवं दिनांक SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARIDWAR)	HW 10687 पृष्ठ का Page 6 of 8										
SUPERSEDES INVENTORY NO. सामग्री सूची संख्या को अधीकृतित करना है	Attachment 1 Standard Testing												
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	 <table border="1" data-bbox="917 504 1380 903"> <thead> <tr> <th>Label</th> <th>Specimen</th> </tr> </thead> <tbody> <tr> <td>ZI</td> <td>Tensile Specimen Centre</td> </tr> <tr> <td>WZ*</td> <td>Hot Tensile Specimen</td> </tr> <tr> <td>KI 1 - KI 3</td> <td>Notched Impact Specimen Centre</td> </tr> <tr> <td></td> <td>Metallographic Specimen</td> </tr> </tbody> </table> * if required in material specification			Label	Specimen	ZI	Tensile Specimen Centre	WZ*	Hot Tensile Specimen	KI 1 - KI 3	Notched Impact Specimen Centre		Metallographic Specimen
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हस्ताक्षर एवं दिनांक SIGN & DATE	REV 03												
सामग्री सूची संख्या INVENTORY P-2206	निर्माणकर्ता WORKED BY Ashish Ranjan	जांचकर्ता CHECKED BY Gopal Krishnan	02.05.17 02.05.17										

सावनी सूची संख्या INVENTORY P2006	SUPERSEDES INVENTORY NO. सावनी सूची संख्या को अधिकारित करता है	COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	स्वत्वधिकार एवं गोपनीय ; इस दस्तावेज में दी गई सूचना भारत भारी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रयोग एवं आश्रय केवल से किया जाना चाहिए, जो कि भारत की सुरक्षा के लिए नुकसानकारक हो ना सके	हस्ताक्षर एवं दिनांक SIGN & DATE  05/05/17		संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARIDWAR)	HW 10687 पृष्ठ का Page 7 of 8																
Attachment 2, Page 1/2 Process Qualification  <table border="1" data-bbox="885 420 1404 1050"> <thead> <tr> <th>Label</th> <th>Specimen</th> </tr> </thead> <tbody> <tr> <td>ZI</td> <td>Tensile Specimen Centre</td> </tr> <tr> <td>ZA</td> <td>Tensile Specimen Rim</td> </tr> <tr> <td>ZQ</td> <td>Tensile Specimen Transverse</td> </tr> <tr> <td>WZ*</td> <td>Hot Tensile Specimen</td> </tr> <tr> <td>KI 1 - KI 12</td> <td>Notched Impact Specimen Centre (FATT)</td> </tr> <tr> <td>KA 1 - KA 3</td> <td>Notched Impact Specimen Rim</td> </tr> <tr> <td>KQ 1 - KQ 3</td> <td>Notched Impact Specimen Transverse</td> </tr> </tbody> </table> * if required in material specification Note the notch positions of the notch impact specimens (see B - B and C - C). B-B  C-C 								Label	Specimen	ZI	Tensile Specimen Centre	ZA	Tensile Specimen Rim	ZQ	Tensile Specimen Transverse	WZ*	Hot Tensile Specimen	KI 1 - KI 12	Notched Impact Specimen Centre (FATT)	KA 1 - KA 3	Notched Impact Specimen Rim	KQ 1 - KQ 3	Notched Impact Specimen Transverse
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REV 08				<table border="1"> <tr> <td>निर्माणकर्ता WORKED BY</td> <td>Ashish Ranjan</td> <td></td> <td>02.05.17</td> </tr> <tr> <td>जांचकर्ता CHECKED BY</td> <td>Gopal Krishnan</td> <td></td> <td>02.05.17</td> </tr> </table>				निर्माणकर्ता WORKED BY	Ashish Ranjan		02.05.17	जांचकर्ता CHECKED BY	Gopal Krishnan		02.05.17								
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SUPERSEDES INVENTORY NO. सामग्री सूची संख्या को अधिकारित करना है	Attachment 2, Page 2/2 Process Qualification									
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	<table border="1" data-bbox="295 430 782 709"> <thead> <tr> <th>Label</th> <th>Specimen</th> </tr> </thead> <tbody> <tr> <td>M</td> <td>Metallographic Specimen</td> </tr> <tr> <td>MP</td> <td>Specimen for Magnetic Particle Test</td> </tr> </tbody> </table>  Upper Surface of the Metallographic Specimen has to be examined. Longitudinal direction must be indicated in the documentation. $A \geq 320 \text{ mm}^2$ Lower Surface of the specimen has to be examined in Magnetic Particle Test.				Label	Specimen	M	Metallographic Specimen	MP	Specimen for Magnetic Particle Test
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संस्थावर एवं दिनांक SIGN & DATE 										
सामग्री सूची संख्या INVENTORY P-2406	REV. 08	निर्माणकर्ता WORKED BY	Ashish Ranjan	 02.05.17						
		जांचकर्ता CHECKED BY	Gopal Krishnan	 02.05.17						