

सामग्री सूची संख्या को  
 SUPERSEDES  
 INVENTORY NO  
 TLV 9238/01, 04/2008

**13% Cr STAINLESS STEEL BARS X20Cr13**

**1.0 General:**  
This specification governs the quality of steel bars in steel grade X20Cr13 (material no. 1.4021).

**2.0 Application:**  
Bars are required for machining of guide and moving blades of steam turbine.

**3.0 Condition of Delivery:**  
Bars shall be supplied in rolled or forged and milled, heat treated condition as per process route 1E according to EN 10088-3. The bars should be straight and free from waviness.



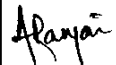
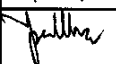
**4.0 Dimension and Tolerances:**  
Unless otherwise stated in purchase order, bars shall be supplied in length 3 to 6 meters with maximum 10% short down to 1 meter.  
Tolerances on the bar shall be as per Table 1, Page 8.

**5.0 GENERAL REQUIREMENTS:**  
The manufacturer must demonstrate that he has implemented a quality system that meets the requirements stipulated in ISO 9000ff.  
The stipulations of the present purchasing specification apply for all the manufacturer's productions shops, as well as their sub-suppliers.  
Any manufacturing steps given to sub suppliers must be got approved from BHEL in writing. When first order is to be supplied, a process qualification according to section "12 Process qualification" must be performed. Separate process qualification is required for each fabrication facility of the manufacturer.  
For cross sections or semi-finished parts that have not been delivered to date, it must be agreed to with BHEL as to whether or not a process qualification is needed.  
Before starting the production, the manufacturer shall provide the purchaser a manufacturing and inspection sequence plan (MIP) for BHEL approval. The MIP establishes the quality assured sequence of operations, of the heat treatment and of the inspection program. Information on internal and external specifications is also given in the MIP.  
BHEL may review manufacturer's internal MIP also.  
The manufacturer has to inform BHEL about every change in manufacturing or inspection process. BHEL may decide on if new qualification is necessary.  
Subcontracting of any manufacturing steps is permissible only after prior approval from BHEL.

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.

स्वत्वाधिकार एवं गोपनीय  
 इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रयोग एवं आच्छादन के बिना किसी भी तरह प्रयोग, जो कि कंपनी के हित में होना आवश्यक हो न किया जाए।

दिनांक एवं हस्ताक्षर SIGN & DATE 11/12/10	नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE			
TSX	B. CHOUDHARY	11/12/10			
PSC Member	V.K. Chauhan	11/12/10	अनुवादक TRANSLATED BY		
STE	P.K. BANSAL	11/12/10	निर्माणकर्ता WORKED BY	ASHISH RANJAN	13.11.10
QAX	N.K. MANWANI	11/12/10	जांचकर्ता CHECKED BY	GOPAL KRISHNAN	11/12/10
संरक्षित विभाग AGREED DEPTT	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	J P MEENA	
			स्वीकृति : संस्थान मानक समिति APPROVED : PLANT STANDARDS COMMITTEE Gr. No. 260		
Rev. 04	Supersedes		निर्माण PREPARED : MTE	जारी : मानक विभाग ISSUED : STANDARDS DIVISION	दिनांक : DATE : 30.03.1992
DT: 06.11.10					

संस्था का प्रमाणित चिह्न & DATE.		<p style="text-align: center;"><b>संस्थान क्रय विनिर्देश (हीप - हार्डवार)</b></p> <p style="text-align: center;"><b>PLANT PURCHASE SPECIFICATION</b></p> <p style="text-align: center;">(HEEP - HARDWAR)</p>	<p style="text-align: right;"><b>HW 10786</b></p> <p style="text-align: right;">पृष्ठ का Page 2 of 12</p>														
समीचीन संख्या को सुपरसेडिज INVENTORY NO.		<p><b>6.0 Manufacture:</b></p> <p><b>6.1 General:</b></p> <p>Degassed steel, e. g. vacuum treated steel shall be used. The use of any other steel treatment shall be agreed upon in advance with BHEL in each individual case.</p> <p>Ingot castings shall be used for manufacturing of these bars.</p> <p><b>6.2 Prefabrication from Bar Material:</b></p> <p>If semi -finished parts are cut from the bar material, (rough part dimensions of the blade), sections shall only be cut in the longitudinal direction.</p> <p>The cross section of the bars and the partitioning used shall be stipulated in the MIP.</p> <p><b>6.3 Heat Treatment:</b></p> <p>Heat treatment as per EN 10088 -3, QT 800, Table A2.</p> <p>If different hardening temperatures, deviating from EN 10088-3 are used, these are to be approved from BHEL in writing. The temperatures shall be listed in MIP together with the hardening process (e.g. hardening out of the rolling heat).</p> <p>Tempering temperature shall be <math>\geq 650</math> °C. Minimal residual stresses shall be achieved by selecting sufficient tempering times and slow cooling rates after tempering.</p> <p>Heat treatment of bundled items is not permissible. If it is necessary to straighten bars after heat treatment, stress relieving is mandatory after completion of the overall straightening process. Stress relieving shall be performed at 20 - 30°C below the tempering temperature and with a slow cooling rate. Process parameters shall be selected with a view to achieving the lowest residual stresses.</p> <p>Distortion of the finish machined part caused by slight residual stresses from the rolling and heat treatment process shall not occur.</p>															
<p style="text-align: center;"><b>COPYRIGHT AND CONFIDENTIAL.</b></p> <p style="text-align: center;">The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.</p>																	
स्वत्वधिकार एवं गोपनीय इस प्रलेख में की गई सूचना भारत भारती इलेक्ट्रिकल्स की संपत्ति है इसका प्रयोग एवं आविष्कार के बिना किसी भी तरह प्रयोग, जो कि कंपनी के हित में प्राधिकारक हो न किया जाए ।		<p><b>7.0 Properties and their verification:</b></p> <p><b>7.1 Chemical Composition:</b></p> <p>Heat analysis in weight %</p> <table border="1" data-bbox="305 1354 1446 1438"> <thead> <tr> <th>C</th> <th>Si</th> <th>Mn</th> <th>P</th> <th>S</th> <th>Cr</th> <th>Ni</th> </tr> </thead> <tbody> <tr> <td>0.17 - 0.22</td> <td>0.10 - 0.60</td> <td>0.30 - 0.80</td> <td><math>\leq 0.030</math></td> <td><math>\leq 0.020</math></td> <td>12.50 - 14.00</td> <td>0.30 - 0.80</td> </tr> </tbody> </table> <p><b>7.2 Properties and Structure:</b></p> <p>Specimen extraction is performed as per attachment 1 and 2. The specimens are to be taken in longitudinal direction (refer attachment 1 &amp; 2).</p> <p>To determine metallurgical properties, a minimum area of 320mm<sup>2</sup> must be examined.</p> <p>Details of locations of specimens, both at bar material and at semi finished parts made of bar material are to be given in MIP, including a sketch of the specimens, for BHEL approval.</p>		C	Si	Mn	P	S	Cr	Ni	0.17 - 0.22	0.10 - 0.60	0.30 - 0.80	$\leq 0.030$	$\leq 0.020$	12.50 - 14.00	0.30 - 0.80
C	Si	Mn	P	S	Cr	Ni											
0.17 - 0.22	0.10 - 0.60	0.30 - 0.80	$\leq 0.030$	$\leq 0.020$	12.50 - 14.00	0.30 - 0.80											
संस्था का प्रमाणित चिह्न SIGN & DATE  14/12/10																	
समीचीन संख्या INVENTORY P-2182	Rev 04	निर्माणकर्ता WORKED BY	Ashish 	13.11.10													
		जांचकर्ता CHECKED BY	Gopal Krishnan 	13.11.10													

सापेक्ष सूची संख्या को  
 SUPERSEDES  
 INVENTORY NO.

**COPYRIGHT AND CONFIDENTIAL**  
 The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interests of the company.

**स्वत्वाधिकार एवं गोपनीय**  
 इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाय ।

दिनांक  
 SIGN & DATE  
 14/11/10

सापेक्ष सूची संख्या  
 INVENTORY NO.  
 P-2182

**7.2.1 Mechanical Properties:**

The mechanical properties shall be determined after all heat treatment steps are finished (including a possible stress relieving).

They shall be determined on the hardest and softest bar per melt and heat treatment batch. If the cross section are > 200cm<sup>2</sup> then the mechanical properties must be determined both in the centre of the bar and at the side of the bar (attachment 2). It shall be ensured that the required mechanical properties are achieved throughout the entire bar cross section.

With the exception of toughness, the difference in properties across the bar cross section shall not exceed 7.5%.

Tensile testing shall be conducted according to EN 10002.

Impact testing shall be performed with standard test pieces with V-notch according to EN 10045.

The following properties at room temperature must be demonstrated by the following tests:

0.2% Yield Strength	Tensile Strength	Elongation (l <sub>0</sub> = 5d)	Reduction of area	Impact Energy	Hardness
N/mm <sup>2</sup>	N/mm <sup>2</sup>	%	%	J	HB 30
≥ 600	800 - 950	≥ 15	≥ 50	≥ 20 <sup>*)</sup>	≤ 280



\*) Average of 3 specimens and minimum value for two specimens as per EN 10021, where the lowest value shall be at least 14J.


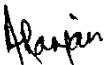
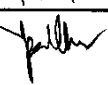
The uniformity of the strength of the bars of a given delivery (per melt and heat treatment batch = test unit) shall be verified by a hardness test per EN ISO 6506 -1. Hardness tests are to be performed after all heat treatments (including a possible stress relieving) are undertaken. HB 10/3000 or HB 5/750 shall be used. The hardness tests shall be performed on 10% of each test unit, however on at least 10 bars, or if the test unit comprises less than 10 bars on every bar.




The greatest permissible difference in hardness shall not exceed 35 HBW. Mechanical properties shall be determined on the hardest and softest bar identified by this test.


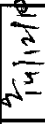
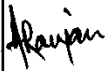

**7.2.2 Microstructure:**


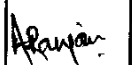

- The examination of cleanliness must be performed in the centre of one bar per melt and heat treatment batch. It can be conducted before or after the heat treatment. The microstructure must be uniform and free from porosity, excessive segregation and other in-homogeneities. The following properties concerning delta ferrite and inclusions shall be achieved:
- Delta ferrite content: < 5%  
(Determined in a manner consistent with the evaluation technique described in ASTM E 45 / Method A, "Worst Field Method" at V = 100:1, specimen orientation: longitudinal).

Rev 04		निर्माणकर्ता WORKED BY	Ashish		13.11.10
		जांचकर्ता CHECKED BY	Gopal Krishnan		13.11.10

चिनांक एवं तिथि SIGN & DATE		<p style="text-align: center;"><b>संस्थान क्रय विनिर्देश (डीप - हरिद्वार)</b></p> <p style="text-align: center;"><b>PLANT PURCHASE SPECIFICATION</b> (HEEP - HARDWAR)</p>	<p style="text-align: right;"><b>HW 10786</b></p> <p style="text-align: right;">पृष्ठ का Page 4 of 12</p>		
सामग्री सूची संख्या को अधिकारित करना है SUPERSIDES INVENTORY NO.	<p>• Inclusion content per ASTM E 45/Method A</p> <ul style="list-style-type: none"> <li>• "Thin series" inclusions: Type A, B, C max.2, Type D max. 2.5</li> <li>• "Heavy series" inclusions: Type A, B, C, D max 1.5</li> <li>• Maximum number and size of globular inclusions (Type D):  <math>IR(D) = n1 + 2.5n2 \leq 10</math>  <math>IR(D)</math> is converted to an area of <math>160 \text{ mm}^2</math>.  <math>n</math> = number of globular inclusions.  <math>n1</math> (25 <math>\mu\text{m}</math> - 50 <math>\mu\text{m}</math>); <math>n2</math> (51 <math>\mu\text{m}</math> - 75 <math>\mu\text{m}</math>).</li> </ul> <p>The size pertains not only to the globular inclusions themselves, but also the subsequent cavities, which can occur beside them. Inclusion and cavities, which are &gt; 75 <math>\mu\text{m}</math> are not allowed.</p> <p>The grain size must be measured at the softest and the hardest bar per test unit after all heat treatments are performed. The following properties must be achieved:</p> <ul style="list-style-type: none"> <li>• Grain size 4 or finer per ASTM E112 or ISO 643. A deviation from the average grain size of more than 2 grain sizes is not permissible.</li> </ul>				
COPYRIGHT AND CONFIDENTIAL. The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	<p><b>7.3 Visual Inspection and Ultrasonic Testing:</b></p> <p><b>7.3.1 Test Scope:</b></p> <p>The following NDT inspections shall be performed after all heat treatments are performed:</p> <ul style="list-style-type: none"> <li>• Visual inspection of all bars</li> <li>• UT of all bars as per TWP 1204.</li> </ul> <p>Requirement: 100% of the volume shall be examined with the stipulated recording level.</p> <p><b>7.3.2 Criteria for recording limits and decision on further use:</b></p> <p><b>a) Surface defects:</b></p> <p>Indications of surface defects, e. g. scoring caused by the rolling process are to be ground at least at both ends, in the center of the indications and in increments of approximately 250 mm to check the extension below the surface.</p> <p>Surface defects with extension <math>\geq 1\text{mm}</math> below the surface not permissible.</p> <p><b>b) Ultrasonic Test:</b></p> <p>Criteria stipulated in TWP 1204 quality class 2 b shall be applied with following modification: EE (single echo) and VE (numerous single echoes) without extension <math>\geq 2 \text{ mm}</math> CRR not permitted.</p>				
स्वत्वधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रयोग एवं अप्रत्याशित रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में दैनिकीकरण में किया जाए।					
चिनांक एवं तिथि SIGN & DATE	24/12/10				
सामग्री सूची संख्या INVENTORY NO.	Rev 04	निर्माणकर्ता WORKED BY	Ashish		13.11.10
1-2182		जांचकर्ता CHECKED BY	Gopal Krishnan		13.11.10

दिनांक एवं एम्प्लॉयर्स SIGN & DATE		<p style="text-align: center;"><b>संस्थान क्रय विनिर्देश (हीप - हार्डवार)</b></p> <p style="text-align: center;"><b>PLANT PURCHASE SPECIFICATION</b> (HEEP - HARDWAR)</p>	<p style="text-align: right;"><b>HW 10786</b></p> <p style="text-align: right;">पृष्ठ का Page 5 of 12</p>			
सामग्री सूची संख्या को अधिष्ठापित करना है	SUPERSEDES INVENTORY NO	<p>Defects above the recording limit shall be marked and it shall be ensured that these bars are not included in the lot delivered.</p> <p>BHEL shall receive written confirmation that all bar sections that contain defects above the recording limit were cut out of the respective bars.</p> <p><b>7.4 Material Identity Test:</b></p> <p>An identity test must be conducted in the as – delivered condition. The inspection scope is:</p> <p style="padding-left: 40px;">Bars: 100%</p> <p style="padding-left: 40px;">Cut pieces: 10%</p> <p>In case that cut pieces are made from the bars then the marking must be performed directly after cutting to prevent any mix-up from occurring during the subsequent processes.</p> <p><b>8.0 Identification Marking:</b></p> <p>All bars are to be marked with supplier's symbol, material designation, melt number, and identification number given on the order. The details are to be clearly stamped and encircled by oil paint. Each bar shall be painted with orange colour at one end.</p> <p>All the bars shall be suitably packed to protect them against corrosion and damage during transportation.</p> <p>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.</p> <p><b>9.0 Documentation:</b></p> <p>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:</p> <ul style="list-style-type: none"> <li>(a) Material code no and P.O. number</li> <li>(b) Material designation</li> <li>(c) Heat no., heat analysis and melting methods</li> <li>(d) Mechanical test results including hardness range and the metallurgical examination as per clause 7.1 &amp; 7.2.</li> <li>(e) Complete information on all heat treatments performed.</li> <li>(f) Results of NDT tests performed.</li> <li>(g) Confirmation of material identification check</li> <li>(h) Confirmation of dimensional and visual check</li> </ul>				
<p style="text-align: center;"><b>COPYRIGHT AND CONFIDENTIAL.</b></p> <p style="text-align: center; font-size: small;">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.</p>						
<p style="text-align: center;"><b>स्वत्वाधिकार एवं गोपनीय</b></p> <p style="text-align: center; font-size: x-small;">इस दस्तावेज़ में दी गई सूचना भारत हेवी इलेक्ट्रिकल लिमिटेड की संपत्ति है। इसका प्रयोग एवं आकांक्षा रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।</p>						
दिनांक एवं SIGN & DATE	24/11/10					
सामग्री सूची संख्या INVENTORY NO.	P-2182	Rev 04	निर्माणकर्ता WORKED BY	Ashish		13.11.10
			जांचकर्ता CHECKED BY	Gopal Krishnan		13.11.10

निर्माण एवं उल्लेख SIGN & DATE		<b>संस्थान क्रय विनिर्देश (हीप - हरिद्वार)</b> <b>PLANT PURCHASE SPECIFICATION</b> <b>(HEEP - HARDWAR)</b>		<b>HW 10786</b> पृष्ठ का <b>Page 6 of 12</b>	
SUPERSEDES INVENTORY NO. शायदी सूची संख्या से अधिकृत किया जाएगा है	<p><b>10.0 Non Conformances:</b></p> <p>Any non-conformances with this delivery specification must be reported to BHEL immediately using a Non conformance Report as per Attachment 4.</p> <p>A non-conformance is considered accepted only if BHEL has agreed in writing to approve or tolerate.</p> <p>The approval is only valid for the delivered material. In case of new deliveries out of a heat that has already been accepted for a previous order, the existing accepted deviation report of the heat has to be submitted together with the new deviation.</p> <p>In case of non-conformance with specified properties, BHEL is entitled to reject the material supplied even if proof testing was not called for.</p> <p><b>11.0 Release:</b></p> <p>Release is based on the collective result of all tests performed. Release does not relieve the manufacturer from his responsibility for hidden defect that are discovered at later stage of manufacturing.</p> <p><b>12.0 Process Qualification:</b></p> <p>A qualification review, performed jointly by BHEL and supplier, is required before starting production for the first order.</p> <p>The initial process qualification is required for each fabrication facility.</p> <p>The inspection parameters stipulated during this phase form the basis of the inspection sequence plan which the supplier prepares at his own responsibility.</p> <p>Unless otherwise stated by BHEL, the process qualification shall be required for the first three orders.</p> <p>At the first three orders the hardness of each bar is to be measured. Mechanical testing is to be performed at the softest and hardest bars.</p> <p>If desired, a process qualification can also be called for as verification of the reliability of fabrication.</p> <p>In addition to the scope of testing and examination stipulated in this purchase specification, the following tests and examinations shall be performed (Attachment 3):</p> <ul style="list-style-type: none"> <li>• <u>Additional tensile tests and impact tests.</u> The mechanical properties in transverse direction (Q1-3, ZQ in Attachment 3) shall not differ from the values in longitudinal direction by more than 10%.<sup>1</sup></li> <li>• Determination of FATT (Fracture Appearance Transition Temperature) according to ASTM A370, FATT &lt; 30° C must be achieved; testing scope no less than 10 specimens.</li> </ul>				
<b>COPYRIGHT AND CONFIDENTIAL</b> 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.					
<b>स्वत्वाधिकार एवं गोपनीय</b> इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी को हित में अधिकारक ही न किया जाए।					
निर्माण एवं डिजाइन SIGN & DATE 					
शायदी सूची संख्या INVENTORY NO. <b>P-2182</b>	Rev 04	निर्माणकर्ता WORKED BY	Ashish		13.11.10
	जांचकर्ता CHECKED BY	Gopal Krishnan		13.11.10	

दिनांक एवं हस्ताक्षर SIGN & DATE		<b>संस्थान क्रय विनिर्देश (हीप - हार्डवार)</b> <b>PLANT PURCHASE SPECIFICATION</b> <b>(HEEP - HARDWAR)</b>	<b>HW 10786</b> पृष्ठ का <b>Page 7 of 12</b>		
SUPERSEDES INVENTORY NO. शायदी सूची संख्या की अपडेटिंग क्रमांक है	<p>All results shall be given in detail in a report to BHEL. The overall results of all examinations are relevant for the release as a qualified supplier.</p> <p>1) If it is not possible to take standard specimen in cross direction, the following specimen shall be used:</p> <ul style="list-style-type: none"> <li>• For tensile testing, a round tensile test specimen of <math>L_0 = 5 d_0</math> or sheet type specimen with a coefficient of proportionality of <math>k = 5.65</math> shall be used.</li> <li>• For impact testing, a subsidiary test piece according to EN 10045 shall be used.</li> </ul> <p>Any size or geometry deviating from the standard specimen must be indicated in MIP.</p>				
<b>COPYRIGHT AND CONFIDENTIAL</b> The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	<p><b>13.0 Cross Referred Standard:</b></p> <p>EN ISO 9000ff, EN 10002-1, EN10045, EN10021, EN10088 -3, EN ISO 6506-1, ASTM E112, DIN 50601, ASTM E45, SEP 1923, EN 10204, ASTM A370, MUN 106.2/1.</p>				
<b>स्वाधिकार एवं गोपनीय</b> इस प्रलेख में दी गई सूचना भारत देश की इलेक्ट्रिकल्स की सम्पत्ति है. इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि, कंपनी के हित में हानिकारक हो न किया जाए।					
हस्ताक्षर एवं दिनांक SIGN & 14/11/10					
शायदी सूची संख्या INVENTORY NO. <b>P-2182</b>	Rev 04	निर्माणकर्ता WORKED BY	Ashish		13.11.10
		जांचकर्ता CHECKED BY	Gopal Krishnan		13.11.10

दिनांक एवं हस्ताक्षर -  
वापस



संस्थान क्रय विनिर्देश (हीप - हरिद्वार)  
**PLANT PURCHASE SPECIFICATION**  
(HEEP - HARDWAR)

**HW 10786**  
पृष्ठ का  
Page 8 of 12

सामग्री सूची संख्या को  
SUPERSEDES  
INVENTORY NO.  
अधिकृत करता है

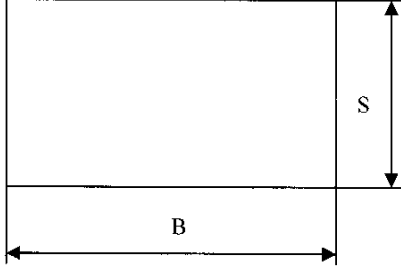
**COPYRIGHT AND CONFIDENTIAL**  
The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.

**स्वत्वाधिकार एवं गोपनीय**  
इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इकाई प्रकल्प एवं अपरिष्कार रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में वित्तिकरक हो न किया जाए।

हस्ताक्षर एवं दिनांक  
SIGN & DATE  
7/4/17/10

सामग्री सूची संख्या  
INVENTORY NO.  
P-2132

TABLE - 1



B, width across flats	Allowable deviation on B, mm	S, Thickness	Allowable deviation on S, mm
$B \leq 35$	+ 1.5	$S \leq 20$	+ 1.0
$35 \leq B \leq 75$	+ 2.0	$20 \leq S \leq 40$	+ 2.0
$B > 75$	+ 3.0	$S > 40$	+ 3.0

Note: Other tolerances shall be as per DIN 1017. Twisting and bending of the bars shall not exceed 0.001 X length of the bar. Bulging on the sides shall not more than 0.01 X B and 0.02 X S respectively.

Rev 04

निर्माणकर्ता WORKED BY	Ashish	<i>Ashish</i>	13.11.10
जांचकर्ता CHECKED BY	Gopal Krishnan	<i>Gopal</i>	13.11.10

**Attachment 1**

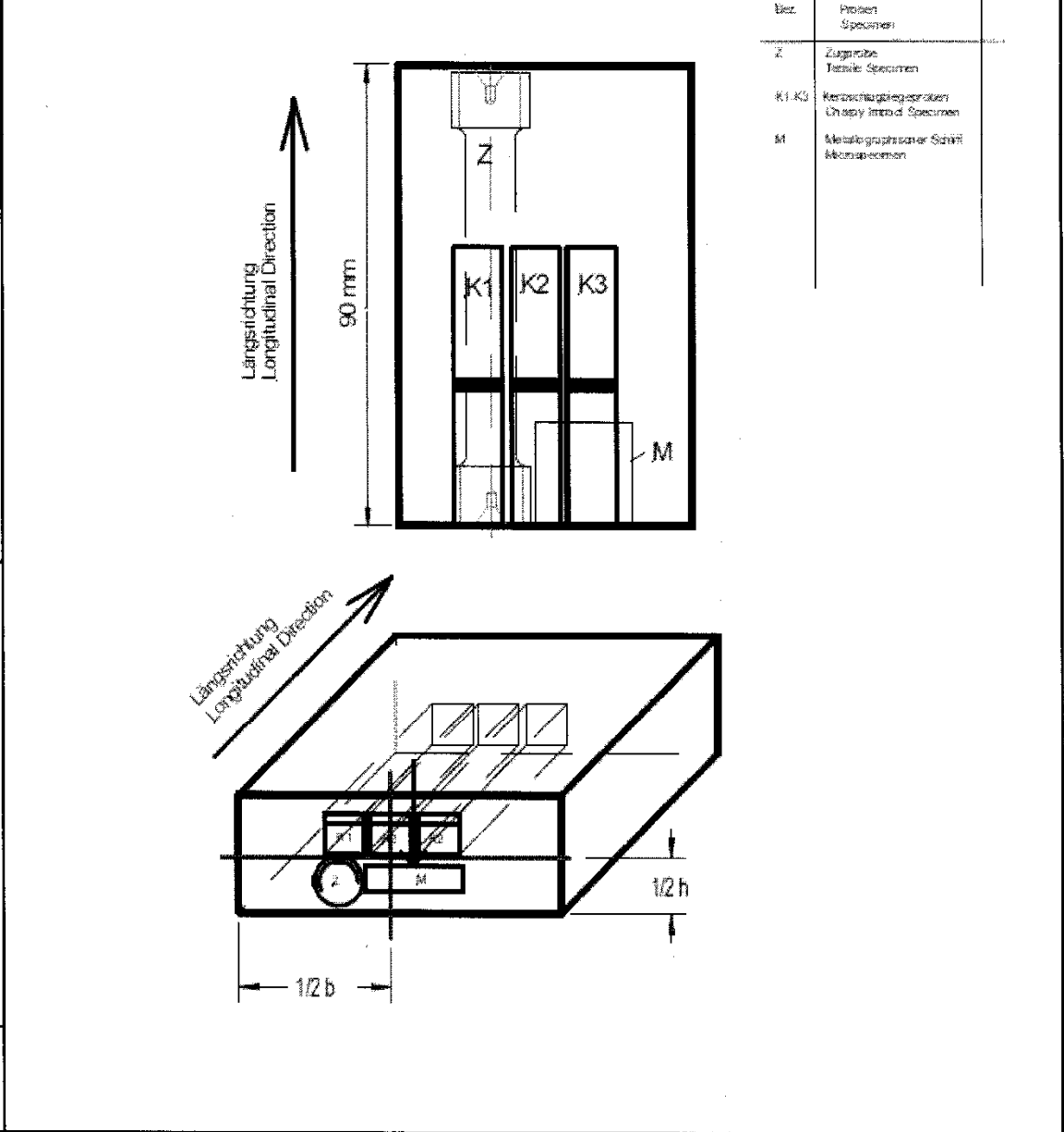
Standard Testing (Cross sectional area  $\leq 200 \text{ cm}^2$ )

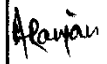
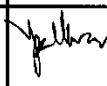
Make sure that all specimens are located in the middle of material.

**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.

**स्वाधिकार एवं गोपनीय**  
 इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है. इसका प्रयोग एवं आश्रय का रूप में किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो, नहीं किया जाना।

इस्तार एवं दिनांक  
 SIGN. &  
 2/11/10



सामग्री सूची संख्या <b>INVENTORY NO.</b> <b>P-2182</b>	Rev 04	निर्माणकर्ता <b>WORKED BY</b> Ashish		13.11.10
सामग्री सूची संख्या <b>INVENTORY NO.</b> <b>P-2182</b>	Rev 04	जांचकर्ता <b>CHECKED BY</b> Gopal Krishnan		13.11.10

सुपरसेड्स  
INVENTORY NO.

सामग्री सूची संख्या का  
अतिरिक्त अंकन है

**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.

**स्वत्वाधिकार एवं गोपनीय**

इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है। इसका प्रयोग एवं आकस्मिक रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में सुविधाकारक हो न कि नुकसान पहुंचाए।

हस्ताक्षर एवं दिनांक  
SIGN & DATE

7/11/2010

सामग्री सूची संख्या  
INVENTORY NO.

P-2182

**Attachment 2**

Standard Testing (Cross sectional area > 200 cm<sup>2</sup>)

Make sure that all specimens are located in the middle of material.

Spec	Proben Specimen
Z1-Z2	Zugproben Tensile Specimen
K1-K6	Kerbschlagprobe Charpy Impact Specimen
M	Metallographischer Schnitt Microspecimen

Langsrichtung  
Longitudinal Direction

90 mm

Langsrichtung  
Longitudinal Direction

1/2 b

1/2 h

Rev 04	निर्माणाकर्ता WORKED BY	Ashish		13.11.10
	जांचकर्ता CHECKED BY	Gopal Krishnan		13.11.10

निर्माक एवं स्वामित्व  
SIGN & DATE:

समग्री सूची संख्या को  
INVENTORY NO.

समग्री सूची संख्या को  
अधिकृतित करना है

स्वत्वाधिकार एवं गोपनीय  
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.

निर्माक एवं स्वामित्व  
SIGN & DATE:  
P-2182  
14/11/10

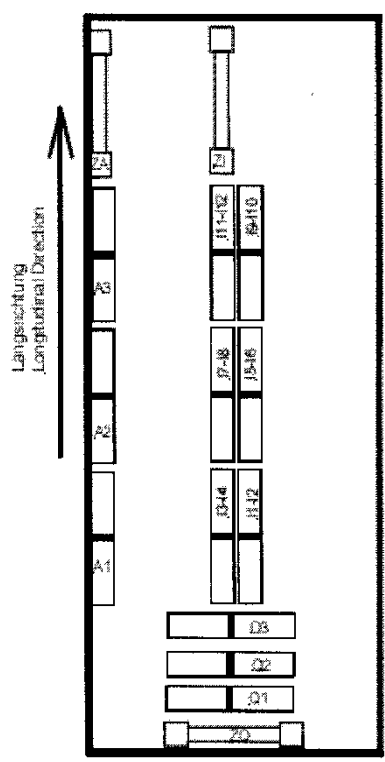


संस्थान क्रय विनिर्देश (सीप - हरिद्वार)  
PLANT PURCHASE SPECIFICATION  
(HEEP - HARDWAR)

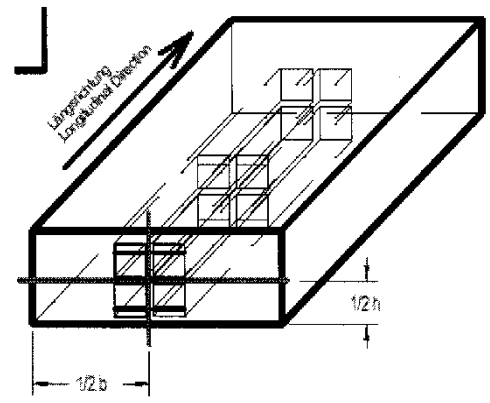
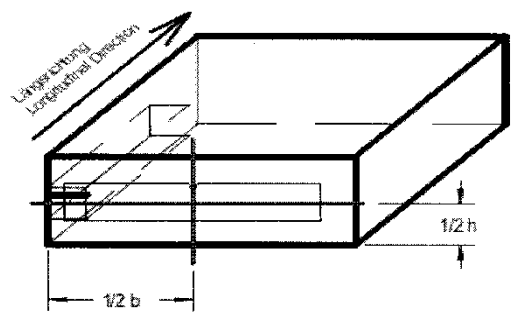
HW 10786  
पृष्ठ का  
Page 11 of 12

Attachment 3

Process Qualification






Make sure that all specimens are located in the middle of material.



Bez.	Proben Specimen
Z	Zugproben Tensile Specimen
11-12	Charpy Schlagversuchspecimen (FAT) Charpy Impact Specimen (FAT)
ZA	Zugprobe Tensile Specimen
A1-A3	Karbonisierungsproben Charpy Impact Specimen
Z3	Zugprobe Tensile Specimen
Q1-Q3	Charpy Schlagversuchspecimen Charpy Impact Specimen

Rev 04

निर्माणकर्ता WORKED BY	Ashish	<i>Ashish</i>	13.11.10
जांचकर्ता CHECKED BY	Gopal Krishnan	<i>Gopal</i>	13.11.10

दिनांक एवं हस्ताक्षर SIGN & DATE		<b>संस्थान क्रय विनिर्देश (हीप - हार्डवार)</b>		<b>HW 10786</b>																																
		<b>PLANT PURCHASE SPECIFICATION</b> (HEEP - HARDWAR)		पृष्ठ का Page 12 of 12																																
SUPERSEDES INVENTORY NO.	<b>Attachment 4</b>																																			
	<table border="1"> <tr> <td>BHEL, Haridwar</td> <td>NON CONFORMANCE REPORT</td> <td>NCR No.</td> </tr> <tr> <td>Order No.</td> <td>Component:</td> <td>Material:</td> </tr> <tr> <td>Supplier:</td> <td>Supplier Order No.:</td> <td>Drawing No:</td> </tr> <tr> <td colspan="3">Description of Non Conformance:</td> </tr> <tr> <td>Attachments</td> <td>Date</td> <td>Signature</td> </tr> <tr> <td colspan="3">Remedial Measures:</td> </tr> <tr> <td>Attachments:</td> <td>Date</td> <td>Signature</td> </tr> <tr> <td colspan="3">BHEL Comment:</td> </tr> <tr> <td>Non Conformance No:</td> <td>Date</td> <td>Department</td> <td>Signature</td> </tr> <tr> <td colspan="3">Category:</td> <td></td> </tr> </table>					BHEL, Haridwar	NON CONFORMANCE REPORT	NCR No.	Order No.	Component:	Material:	Supplier:	Supplier Order No.:	Drawing No:	Description of Non Conformance:			Attachments	Date	Signature	Remedial Measures:			Attachments:	Date	Signature	BHEL Comment:			Non Conformance No:	Date	Department	Signature	Category:		
BHEL, Haridwar	NON CONFORMANCE REPORT	NCR No.																																		
Order No.	Component:	Material:																																		
Supplier:	Supplier Order No.:	Drawing No:																																		
Description of Non Conformance:																																				
Attachments	Date	Signature																																		
Remedial Measures:																																				
Attachments:	Date	Signature																																		
BHEL Comment:																																				
Non Conformance No:	Date	Department	Signature																																	
Category:																																				
<b>Copyright and Confidential</b> 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.																																				
<b>स्वत्वाधिकार एवं गोपनीय</b> इन प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है, इस्तेमाल प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, उसे हिक कायती के हिस में प्रतिकारक हो न किया जाए।																																				
दिनांक एवं हस्ताक्षर SIGN & DATE P-2182 14/11/10	<b>REV.NO. 04</b>				निर्माणकर्ता WORKED BY ASHISH  13.11.10																															
जांचकर्ता CHECKED BY P-2182 14/11/10	जांचकर्ता CHECKED BY Gopal Krishnan  13.11.10																																			