



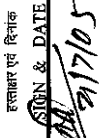

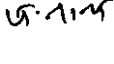




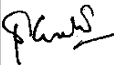
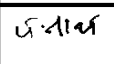
दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)	HW 19799 - मुख पृष्ठ PREFACE SHEET
सामग्री सूची संख्या को SUPERSEDES INVENTORY NO. अधिकारित करता है	<p align="center"> NODULAR GRAPHITE IRON CASTING EN-GJS-400-18U-RT (GGG40.3) WITH IDENTIFICATION NUMBER </p> <p align="center"> केवल आंतरिक प्रयोग हेतु प्रदायक को देने से पूर्व इस मुखपृष्ठ को निकाल दें । </p> <p align="center"> FOR INTERNAL USE ONLY REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS. </p> <p align="right"> } : NIL </p> <p> समतुल्य मानक/सूची आदि COMPARABLE STANDARDS / CATALOGUES ETC. </p> <p align="right"> } : AS PER PMD </p> <p> सुझाए/सम्भावित प्रदायक एवं श्रेणी SUGGESTED / PROBABLE SUPPLIERS AND GRADES. </p> <p align="right"> } : BASED ON EN 1563 </p> <p> कोई अन्य जानकारी ANY OTHER INFORMATIONS </p>		
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स्वाधिकार एवं गोपनीय इस प्रलेख में कोई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है, इसका प्रयोग एवं अपरिष्कार इस सूचना से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।			
हस्ताक्षर एवं दिनांक SIGN & DATE 			
सामग्री सूची संख्या INVENTORY NO. P-2008	REV 01 11-6-05	स्वीकृति : संस्थान मानक समिति APPROVED : PLANT STANDARDS COMMITTEE	तैयारी : मानक विभाग ISSUED : STANDARDS DIVISION दिनांक : 14-12-1990


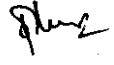
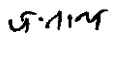
दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (डीप - हार्डवार) PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)		HW 19799 पृष्ठ का Page 1 of 6	
		NODULAR GRAPHITE IRON CASTING EN-GJS-400-18U-RT(GGG40.3) WITH IDENTIFICATION NUMBER .			
सारणी सूची संख्या को INVENTORY NO.	1. GENERAL This specification governs the quality of nodular cast iron of grade EN-GJS-400-18U-RT according to EN 1563 (Material No. 0.7043) .				
	2. APPLICATION This material specification is valid for small castings of cast iron with nodular graphite.				
सारणी सूची संख्या को INVENTORY NO.	3. CONDITION OF DELIVERY The casting shall be delivered to the condition as stated in ordering drawing.				
	4. REFERENCED DOCUMENTS EN 1563, DIN 1685-1, EN 1370, BNIF 359-01, MSS-SP-55, EN 10204, HW0980829 (PA 11.61) , HW0980831(PA 11.70) Equivalent standard can also be used after approval from BHEL				
सारणी सूची संख्या को INVENTORY NO.	5. DIMENSION & TOLERANCE 5.1 Casting shall be supplied to the dimension shown on the drawing accompanying the order. 5.2 Tolerance: General tolerances as per DIN1685 part-1, accuracy degree GTB18 are applicable.				
	6. MANUFACTURE 6.1 The method of manufacture is left to the discretion of the supplier unless otherwise mutually agreed. The supplier shall examine the suitability of casting with respect to ordering drawing. In case of any change required or for testing any modification required, the supplier shall discuss with the BHEL for approval. If additional material thickness for dross is retained in delivery condition, this shall be agreed with the purchaser. 6.2 The manufacturer shall forward manufacturing plan and Non destructive Test plan, for approval, to BHEL before the commencement of production. BHEL reserves the right to inspect the production documents of the manufacturer. If a standard plan is available with the manufacturer this can be considered instead of individual manufacturing Plan.				
हस्ताक्षर एवं दिनांक SIGN & DATE 21/7/05	सारणी सूची संख्या INVENTORY NO. P-2008	अनुवादक TRANSLATED BY TSX KISHAN LAL WNL 20/7-05	निर्माणकर्ता WORKED BY MEMBER P.S.C. N.R.De N. 18/7/05	जांचकर्ता CHECKED BY OAX N.K.MANWAN (Signature) 21.7.05	पर्यवेक्षणकर्ता SUPERVISED BY VB ARORA (Signature) 21/7/05
स्वीकृति : संस्थान मानक समिति APPROVED : PLANT STANDARDS COMMITTEE		निर्माण : PREPARED : MTE	जारी : मानक विभाग ISSUED : STANDARDS DIVISION	दिनांक : DATE : 14-12-90	




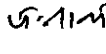
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स्वत्वाधिकार एवं गोपनीय
 इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रयोग एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।

रिनार्क एवं स्टाम्प SIGN & DATE		<p style="text-align: center;">संस्थान क्रय विनिर्देश (डीप - हरिद्वार)</p> <p style="text-align: center;">PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)</p>	<p style="text-align: right;">HW 19799-</p> <p style="text-align: right;">पृष्ठ का Page 2 of 6</p>		
सामग्री सूची संख्या को SUPERSEDES INVENTORY NO. अधिकार करता है	<p>7. HEAT-TREATMENT</p> <p>The casting ordered according to this specification shall have material with assured notch impact work and deformability. If the casting requires, according to the experience of the manufacturer, a ferritising heat-treatment for achieving the properties required in clause 10, or when the required properties are not achieved without heat treatment, and the necessity of ferritising heat treatment is felt, manufacturer shall inform the detailed process to BHEL.</p>				
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	<p>8. CHEMICAL COMPOSITION</p> <p>The chemical composition is to be selected by manufacturer to satisfy the required properties.</p> <p>9. SELECTION OF TEST SAMPLES</p> <p>9.1 The mechanical properties as given in clause 10.1 are to be determined for each casting with identification number.</p> <p>It is permitted in case of a delivery of a batch of casting with individual rough casting weight upto 500 kg to prove the properties on casting per heat per heat-treatment batch (if heat-treatment is carried out). All the casting of that heat and heat-treatment batch are subjected to hardness test and values reported in acceptance test certificate. For casting on which it is difficult to carried out direct hardness test, a test on integrally cast block of $\phi 30 \times 30$ may be agreed. Cast on samples shall only be separated (by cold method) after heat treatment where this applies. The parting surface should be ground and hardness measured on it.</p> <p>9.2 The mechanical properties as per clause 10.1 are to be proved on the integrally cast keel block as per EN 1563 , fig-6 type 1 or 2 (depending upon the wall thickness in the zones of casting carrying pressure). In case of separately cast keel block, dimension of keel block should match the wall thickness of the casting body or as agreed in manufacturing plan.</p> <p>9.3 The integral keel block shall be large enough so that the required specimens for testing of mechanical properties can be taken out in adequate number including repeat testing.</p> <p>9.4 The standardised keel block shall be located on the casting as per foundry technological consideration and left to the manufacturer.</p> <p>9.5 The location of keel block on casting is to be recorded by photography or on a sketch, which is to be delivered along with the acceptance test certificate.</p> <p>9.6 After internal testing and release by supplier, two keel blocks shall be left on the casting or separated, packed and sent to BHEL for control testing. If not earlier, the keel block shall be cut after ferritising heat treatment in case it is to be carried out to get ferrite structure.</p>				
स्वत्वाधिकार एवं गोपनीय इस प्रारंभ में ही यह सूचना भारत भारी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रस्ताव एवं अप्रस्ताव रूप से किसी भी तरह प्रयोग, जो कि कम्पनी के हित में हितकारक हो न किया जाए ।	<p>9.7 Any deviation from the above shall be indicated by the supplier in the manufacturing plan for prior approval from BHEL.</p>				
हस्ताक्षर एवं रिनार्क SIGN & DATE 					
सामग्री सूची संख्या INVENTORY NO. P-2008	REV 01	DATE 11.6.05	निर्माणकर्ता WORKED BY SSG		1572
			जांचकर्ता CHECKED BY P.NATH		

दिनांक एवं हस्ताक्षर SGN & DATE		<p style="text-align: center;">संस्थान क्रय विनिर्देश (डीप - हार्डवार)</p> <p style="text-align: center;">PLANT PURCHASE SPECIFICATION</p> <p style="text-align: center;">(HEEP - HARDWAR)</p>		<p style="text-align: right;">HW 19799</p> <p style="text-align: right;">पृष्ठ का Page 3 of 6</p>																			
सामग्री सूची संख्या को अधिकृतित करना है SUPERSEDES INVENTORY NO.	<p>10. MECHANICAL PROPERTIES</p> <p>In the delivery conditions the casting shall have the following properties on integrally cast or separately cast keel block at room temperature:</p> <p>10.1 For wall thickness</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">From 30 to 60mm</td> <td style="text-align: center;">above 60 to 200mm</td> </tr> <tr> <td>0.2% Proof Stress*</td> <td style="text-align: center;">≥ 250 N/mm²</td> <td style="text-align: center;">≥ 240 N/mm²</td> </tr> <tr> <td>Tensile strength</td> <td style="text-align: center;">≥ 390 N/mm²</td> <td style="text-align: center;">≥ 370 N/mm²</td> </tr> <tr> <td>Elongation (l₀=5d₀)</td> <td style="text-align: center;">≥ 15%</td> <td style="text-align: center;">≥ 12%</td> </tr> <tr> <td>Redn. In area</td> <td style="text-align: center;">: for information</td> <td style="text-align: center;">for information</td> </tr> <tr> <td>Impact**</td> <td style="text-align: center;">: ≥ 14J ***</td> <td style="text-align: center;">≥ 12J ****</td> </tr> </table> <p>* Determination of yield limit instead of 0.2% ps is permitted. ** Mean of three ISO-V samples. *** Smallest value should be minimum 11 J. **** Smallest value should be minimum 9 J</p>						From 30 to 60mm	above 60 to 200mm	0.2% Proof Stress*	≥ 250 N/mm ²	≥ 240 N/mm ²	Tensile strength	≥ 390 N/mm ²	≥ 370 N/mm ²	Elongation (l ₀ =5d ₀)	≥ 15%	≥ 12%	Redn. In area	: for information	for information	Impact**	: ≥ 14J ***	≥ 12J ****
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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	<p>11 RECTIFICATION WELDING</p> <p><u>Weldings are only allowed after approval by the purchaser in a written form.</u></p> <p>If approved welding will be performed, the vendor shall fulfill following requirement.</p> <p>11.1 Precondition: The supplier shall submit the following data and keep them up to date for approval and subsequent order.</p> <ul style="list-style-type: none"> - Record of qualification of welder. - Report on procedure testing or a corresponding welding test on same material. <p>The supplier shall prepare detail welding plan and submit to BHEL for approval. The data for pre and post treatment shall also be given in this plan.</p>																						
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हस्ताक्षर एवं दिनांक SGN & DATE 	<p>11.3 Testing of weld spots</p> <p>All the rectification welding are subjected to magnetic particle or dye penetration test for determination of surface crack after grinding (and if agreed upon, after heat treatment).</p>																						
सामग्री सूची संख्या INVENTORY NO. P-2008	REV 01	DATE 11.6.05	निर्माणकर्ता WORKED BY	SSG	 1573/05																		
			जांचकर्ता CHECKED BY	P.NATH																			

दिनांक एवं हस्ताक्षर SIGN & DATE		<p style="text-align: center;">संस्थान क्रय विनिर्देश (हीप - हार्डवार)</p> <p style="text-align: center;">PLANT PURCHASE SPECIFICATION</p> <p style="text-align: center;">(HEEP - HARDWAR)</p>	HW 19799 पृष्ठ का Page 4 of 6			
सामग्री सूची संख्या को अधिकृत करता है SUPERSEDES INVENTORY NO.	<p>A volume test shall be conducted for weld portion with a depth of greater than 50% of wall thickness. The cracks in the rectified areas as well as surrounding area is not permissible. Quality level of repaired zone shall be same as the quality level of casting in that zone.</p> <p>12 NDT AT SUPPLIER'S WORKS</p> <p>12.1 General</p> <p>The basis for NDT are plant standard HW0980829 (PA 11.61) and HW0980831 (PA11.70).</p> <p>As far as there are no stronger requirements on the quality levels in the additional ordering data, e.g. drawings, the general quality level for the casting is quality level 4, i.e. S4 and V4. The surfaces of the castings shall be clean and allow for visual inspection as per MSS SP 55. If NDT is performed, the surfaces shall be fit for testing, e.g. ground over.</p> <p>12.2 Scope of Inspection</p> <p>Following NDT shall be performed in delivery condition :</p> <p>a) Visual inspection of all outer and inner surfaces.</p> <p>b) MPI on following areas:</p> <p>1) areas with quality level S3 or better (see order drawing). According to HW0980829 (PA 11.61) e.g. especially the transition to the body of casting.</p> <p>In case of excess material in the testing areas which will be machined off in the final shape, MPI can be omitted.</p> <p>2) Lifting elements like lifting lugs etc., especially the transition to the body of the casting.</p> <p>3) Welded areas, if any.</p> <p>On faces being inaccessible for a proper MPI, DPT may be performed instead.</p> <p>c) Volume examination by Ultrasonic testing on following areas according to HW0980831 (PA 11.70):</p> <ul style="list-style-type: none"> • Supports, guiding areas. • Lifting elements like lifting lugs etc. • Positions with grouted bolts. • Convex sealing areas • Areas with special requirements marked in the drawing or in a sketch. • Welded areas, if any. 					
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स्वत्वधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती 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।						
दिनांक एवं हस्ताक्षर SIGN & DATE 17/10/15						
सामग्री सूची संख्या INVENTORY NO. P-2008	REV 01	DATE 11.6.05	निर्माणकर्ता WORKED BY जांचकर्ता CHECKED BY	SSG P.NATH	 	1573

दिनांक एवं इस्थान SIGN & DATE		<p style="text-align: center;">संस्थान क्रय विनिर्देश (हीप - हार्डवार)</p> <p style="text-align: center;">PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)</p>	HW 19799 पृष्ठ का Page 5 of 6			
सामग्री सूची संख्या को अधिकृत करता है SUPERSEDES INVENTORY NO.	<p>12.3 Criteria for Registration and Decision :</p> <p>a) Visual Inspection</p> <p>Criteria of standard MSS SP-55, Type I, III to VII, IX, X, XII shall be applied. Surface according to sketches a) and b) are acceptable.</p> <p>b) Surface crack inspection</p> <p>As far as there is no higher requirements mentioned in the drawing - generally criteria of standard HW0980829 (PA 11.61), quality class S4 shall be applied . For areas with special requirements, quality class S3 and for Sealing areas quality class S1 shall be applied.</p> <p>Remarks:</p> <p>In case of excess material on sealing areas or flange faces which will be machined off, the quality classes V1 to V4 approved by UT instead of the quality class S1 to S4 shall be applied accordingly</p> <p>c) Volume examination</p> <p>Criteria of standard HW0980831 (PA 11.70) shall be applied for recording. As far as there are no higher requirements mentioned in the drawing - generally criteria of standard HW0980831 (PA 11.70) , quality class V4 and for Sealing areas quality class V1 shall be applied for decision.</p> <p>Recordable indications, located in machining areas, can be judged individually by BHEL.</p>					
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	<p>13. TEST CERTIFICATE</p> <p>The supplier shall furnish 4 copies of test certificate 3.1B according to EN10204 to BHEL unless otherwise specified on the order. The test certificate shall contain the following, which must reach BHEL before or along with the casting.</p> <p>a. BHEL Reference:</p> <ul style="list-style-type: none"> - Material specification. - Order number. - Name and drawing number of the casting. - Identification No. <p>b. Supplier's Reference:</p> <ul style="list-style-type: none"> - Name or emblem. - Melt number and grade EN-GJS-400-18U-RT. - Method of melting. 					
स्वत्वधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रयोग एवं आरक्षण रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।						
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सामग्री सूची संख्या INVENTORY NO. P-2008	REV 01	DATE 11.6.05	निर्माणकर्ता WORKED BY	SSG		593
			जांचकर्ता CHECKED BY	P.NATH		

दिनांक एवं हस्ताक्षर SIGN & DATE		<p style="text-align: center;">संस्थान क्रय विनिर्देश (डीप - हरिद्वार)</p> <p style="text-align: center;">PLANT PURCHASE SPECIFICATION</p> <p style="text-align: center;">(HEEP - HARDWAR)</p>	<p style="text-align: right;">HW 19799</p> <p style="text-align: right;">पृष्ठ का Page 6 of 6</p>			
सामग्री सूची संख्या को अधिष्ठापित करना है	SUPERSEDES INVENTORY NO.	<ul style="list-style-type: none"> - Photograph of sketch of the location of the keel block. - Heat treatment details including actual temperature, holding times and cooling rates should be presented in the form of a sketch, if carried out. - Photograph of sketches with complete view showing the weld repair on the entire casting. - Reference to the list of qualified welders and to the approved welding procedure. <p>c. Test results:</p> <ul style="list-style-type: none"> - Melt analysis. - Mechanical test and its individual value including hardness test - Test report on magnetic particle inspection/dye penetration examination/ultrasonic. <p>d. Certification that the casting conform to the specified quantity level.</p> <p>e. Dimensional Report.</p> <p>14. CLEARANCE FOR DELIVERY</p> <p>14.1 BHEL evaluates the total results with regard th the intended operational requirements of the casting and judges according to admissibility of deviations, if any, form the properties required in this specification.</p> <p>14.1 The clearance does not release the supplier from the responsibility for hidden defects which are detected at later stage of manufacturing.</p> <p>15. IDENTIFICATION MARKING</p> <p>The identification numbers shown in the order and the standardised material designation EN-GJS-400-18U-RT are to be cast on the location shown in the ordering drawing. Other identification mark such as the seal of the customer, the inspector of the supplier of third party agency or works internal details are to be put directly near the identification no. All the keel blocks shall be clearly indentified with the identification number.</p> <p>16. PACKING</p> <p>Each casting shall be suitably protected from corrosion and damage during transit by anticorrosive paint HE 1707 (Produced by Central Insulation Technology BHEL Bhopal) or Petrolatom (product of Bharat Petroleum). The overseas suppliers may use Tectyle 506 (produced by M/s Vololine, Germany).</p>				
<p style="text-align: center;">COPYRIGHT AND CONFIDENTIAL</p> <p style="text-align: center;">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</p>						
<p style="text-align: center;">स्वत्वाधिकार एवं गोपनीय</p> <p style="text-align: center;">इस दस्तावेज में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रस्ताव एवं आस्वाक रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए ।</p>						
हस्ताक्षर एवं दिनांक	SIGN & DATE					
सामग्री सूची संख्या INVENTORY NO.	REV	DATE 11.16.05	निर्माणकर्ता WORKED BY	SSG		1513
P-2008	01		जांचकर्ता CHECKED BY	P.NATH	