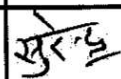
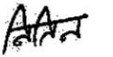
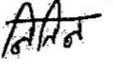
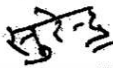
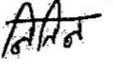
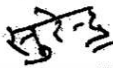
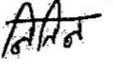
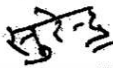


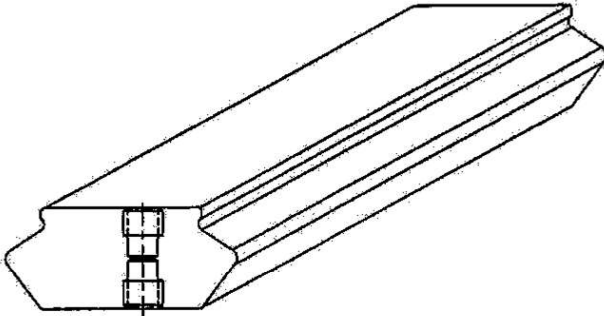
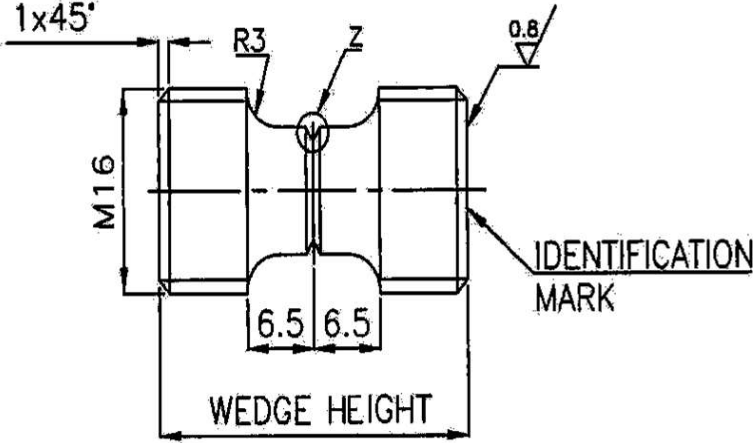
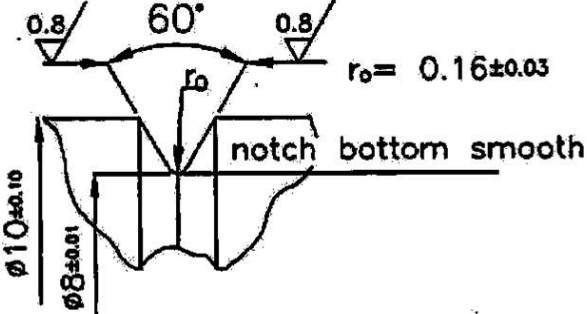
दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप : हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		HW12199		
				पृष्ठ 6 का 1 Page 1 of 6		
सुपरसेड्स INVENTORY NO.	<u>COLD DRAWN AND HEAT TREATED COPPER WEDGES</u> <u>(Cu Ni 2 Si + Zr)</u>					
समीचीन सूची संख्या को अधिकृतित करना है	1. <u>GENERAL:</u> This specification governs the requirements for copper wedges of material grade CuNi2Si+Zr with dimensions according to ordering drawing.					
COPYRIGHT AND CONFIDENTIAL The information on this documents 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.	2. <u>APPLICATION:</u> For rotor slot wedges of Turbogenerators.					
	3. <u>CONDITION OF DELIVERY:</u> Cold drawn and heat treated.					
	4. <u>REFERENCE STANDARD:</u> Based on TLV 9727-01, Jan.2016 and BHEL experience.					
	5. <u>COMPLIANCE WITH NATIONAL STANDARD:</u> There is no Indian standard covering this material.					
	6. <u>DIMENSIONS AND TOLERANCES:</u> The dimensional tolerances for straightness and twist are 0.8 mm (maximum) per meter of wedge length. Tolerance for the length is +10/-0 mm. The wedge profile must comply with all the conditions and dimensions of the ordering drawings. The dimensions specified in the ordering drawing are to be verified on at least 3 wedges (start, middle, end) of each extrusion lot. Check straightness and twisting in finished delivery condition on 100% wedges. Place the wedge with the wide and narrow side horizontally on a measuring plate for checking and measuring gap between wedge surface and measuring plate by feeler gauge. When measuring, the wedges should not be loaded or tilted at one end (longitudinal direction). The gap between wedge surface and measuring plate should not exceed 0.8 mm/m. In case wedge length is in between, appropriate gap allowed should be calculated. Wedges, which exceed the 0.8 mm/m limit, should not be straightened.					
स्वतंत्राधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत भारती भारतीभारत लिमिटेड की संपत्ति है इसका प्रकाश एवं प्रसारण इस से बिना अनुमति के नहीं किया जा सकता	दिनांक एवं हस्ताक्षर SIGN & DATE TSX ARVIND 13.02.25 MTE Subodh 13.02.25 QAX B.B. Tripathy 13.02.25 PSC Member S. S. MEENA 13.2.25					
समीचीन सूची संख्या INVENTORY NO. P-2264	सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	अनुवादक TRANSLATED BY	नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
				जांचकर्ता CHECKED BY	NITIN BANSAL	13/2/25
				पर्यवेक्षणकर्ता SUPERVISED BY	S. S. MEENA	13.2.25
				स्वीकृति संस्थान मानकीकरण समिति APPROVED : PLANT STANDARDIZATION COMMITTEE		Gr. NO. 2.67
	REV.NO. Dt. CHANGE ADVICE NO.	09 13.02.25 TSX(EME)-25-14	निर्माण PREPARED : EME		जारी ISSUED : TSX	दिनांक DATE : 10.11.80

दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप : हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP: HARIDWAR)	HW12199 पृष्ठ 6 का 2 Page 2 of 6																										
समीचीन सूची संख्या INVENTORY NO	सुपरसेड INVENTORY NO	7. MANUFACTURE: Starting from the solution treatment temperature, wedges are to be extrusion molded in water. After extrusion molding, only cold drawing with cold deformation around 10% should be performed. To meet the specified mechanical properties, precipitation hardening has to be performed. Straightening of wedges is only acceptable in the solution treated state & not after precipitation hardening. Any deviations from the production process have to be agreed upon with BHEL.																											
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.		8. FREEDOM FROM DEFECTS: Wedges should have a uniform and smooth surface. Cracks, scales, indentations, bubbles, glitter and impressed foreign particles should not exist. Fettling in radii and at the wedge load bearing surfaces (dovetail portion and adjacent radii) can only be accepted after being approved by BHEL. Minor rework activities at other locations are acceptable provided the tolerances given in the order drawing are adhered to.																											
		9. CHEMICAL COMPOSITION: Chemical composition shall be as given below.																											
		<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Element</th> <th>Percent (%)</th> </tr> </thead> <tbody> <tr><td>Ni</td><td>1.6-2.5</td></tr> <tr><td>Si</td><td>0.5-0.8</td></tr> <tr><td>Cr</td><td>0.05-0.15</td></tr> <tr><td>Zr</td><td>0.15-0.25</td></tr> <tr><td>Cu</td><td>Rest</td></tr> </tbody> </table> Additives allowed <table border="1" style="width:100%; border-collapse: collapse;"> <tbody> <tr><td>Mn</td><td>≤ 0.4</td></tr> <tr><td>Pb</td><td>≤ 0.01</td></tr> <tr><td>Zn</td><td>≤ 0.5</td></tr> <tr><td>Fe</td><td>≤ 0.2</td></tr> <tr><td>Sn</td><td>≤ 0.2</td></tr> <tr><td>Al</td><td>≤ 0.04</td></tr> <tr><td>P</td><td>≤ 0.005</td></tr> <tr><td>Mg</td><td>≤ 0.05</td></tr> </tbody> </table>		Element	Percent (%)	Ni	1.6-2.5	Si	0.5-0.8	Cr	0.05-0.15	Zr	0.15-0.25	Cu	Rest	Mn	≤ 0.4	Pb	≤ 0.01	Zn	≤ 0.5	Fe	≤ 0.2	Sn	≤ 0.2	Al	≤ 0.04	P	≤ 0.005
Element	Percent (%)																												
Ni	1.6-2.5																												
Si	0.5-0.8																												
Cr	0.05-0.15																												
Zr	0.15-0.25																												
Cu	Rest																												
Mn	≤ 0.4																												
Pb	≤ 0.01																												
Zn	≤ 0.5																												
Fe	≤ 0.2																												
Sn	≤ 0.2																												
Al	≤ 0.04																												
P	≤ 0.005																												
Mg	≤ 0.05																												
10. TEST SAMPLES: 10.1 Number of test samples for mechanical testing: Order lot quantity : upto 999 KG = 2 samples 1000-1999 KG = 3 samples 2000-3000 KG = 4 samples Additional 1 sample for each 1000 KG above 3000KG.		10.2 The test sample, after heat treatment shall not be mechanically worked except for preparing the test piece before they are tested.																											
10.3 One sample from each heat shall be analyzed for chemical composition.																													
दिनांक एवं हस्ताक्षर SIGN & DATE	समीचीन सूची संख्या INVENTORY NO	REV. NO.	निर्माणकर्ता WORKED BY जांचकर्ता CHECKED BY																										
09	09	09	NITIN BANSAL S.S. MEENA																										
		13/2/25	13.2.25																										

दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप : हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		HW12199											
				पृष्ठ 6 का 3 Page 3 of 6											
सुपरसेड्स INVENTORY NO. सामग्री सूची संख्या से अधिकृतित करता है	11. MECHANICAL PROPERTIES : The material when tested in accordance with IS: 1608 (Method for tensile testing of copper and copper alloys) shall achieve following mechanical properties at room temperature. Longitudinal direction (sample to be taken from starting of the extruded bar)														
<table border="1"> <thead> <tr> <th>Test</th> <th>Acceptable Value</th> </tr> </thead> <tbody> <tr> <td>0.2 % Proof Stress, $R_{p0.2}$</td> <td>$\geq 520 \text{ N/mm}^2$</td> </tr> <tr> <td>Tensile Strength, R_m</td> <td>590-750 N/mm^2</td> </tr> <tr> <td>% Elongation on Gauge length ($L_0=5d_0$)</td> <td>$\geq 5\%$</td> </tr> <tr> <td>Reduction in area</td> <td>$\geq 15 \%$</td> </tr> </tbody> </table>						Test	Acceptable Value	0.2 % Proof Stress, $R_{p0.2}$	$\geq 520 \text{ N/mm}^2$	Tensile Strength, R_m	590-750 N/mm^2	% Elongation on Gauge length ($L_0=5d_0$)	$\geq 5\%$	Reduction in area	$\geq 15 \%$
Test	Acceptable Value														
0.2 % Proof Stress, $R_{p0.2}$	$\geq 520 \text{ N/mm}^2$														
Tensile Strength, R_m	590-750 N/mm^2														
% Elongation on Gauge length ($L_0=5d_0$)	$\geq 5\%$														
Reduction in area	$\geq 15 \%$														
Through Thickness – Notch (Refer Annexure-1 for test sample details)															
<table border="1"> <tbody> <tr> <td>Tensile Strength, (R_{mk})</td> <td>$\geq 700 \text{ N/mm}^2$</td> </tr> </tbody> </table>						Tensile Strength, (R_{mk})	$\geq 700 \text{ N/mm}^2$								
Tensile Strength, (R_{mk})	$\geq 700 \text{ N/mm}^2$														
12. ELECTRICAL CONDUCTIVITY: The material shall be tested (one per lot) for the electrical conductivity. Electrical conductivity of the material shall be $\geq 15 \text{ MS/m}$.															
13. NON- DESTRUCTIVE TESTING: (A) Ultrasonic Test: The finished wedges have to be 100% ultrasonically tested (test method, evaluation and acceptance norms as per TG40106). (B) Surface crack test: Eddy current test to be performed on 100% finished wedges. When Eddy Current Test is not performed, then DP testing as per AA0850131 or fluorescent penetrant test as per DIN EN ISO 3452 is to be performed. The penetrant must remain in contact with the test piece surface for minimum ten (10) minutes and maximum sixty (60) minutes. The penetrant bleed out from an indication may be larger than the indication that caused it; however, the penetrant bleed out is the basis for acceptance evaluation and shall be determined at the minimum developer dwell time.															
स्वतंत्राधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत हेवी एलिक्ट्रिकल्स लिमिटेड की संपत्ति है, इसका प्रसारण एवं उपयोग केवल उसी शर्त पर ही किया जा सकता है जो कि कंपनी के हित में अधिकतम	दिनांक एवं हस्ताक्षर SIGN & DATE 														
सामग्री सूची संख्या INVENTORY P-2264	REV. NO. 09	निर्माणकर्ता WORKED BY NITIN BANSAL	AA	13/2/25											
		जांचकर्ता CHECKED BY S.S. MEENA		13.2.25											

दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप : हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		HW12199 पृष्ठ 6 का 4 Page 4 of 6	
SUPERSEDES INVENTORY NO. आगामी सूची संख्या को अधिकतम करता है	FOLLOWING INDICATIONS ARE NOT PERMITTED: 1) Linear indications (Indications are considered linear if the length is ≥ 3 X width of the indication). 2) Round indications with any dimension greater than 1.5 mm. 3) Four or more round indications less than 1.5 mm in major axis which are in a line and are separated by 1.5 mm or less, edge to edge. 4) The accumulation of major axis dimension of rounded indications exceeding 38.1 mm in any 3871 mm² of surface, with the major dimension of the area not greater than 152 mm.				
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.	14. TEST CERTIFICATES: The supplier shall submit 5 copies of test certificates giving the following information: 1) BHEL Purchase Order No. 2) Spec. No. HW12199 3) Supplier's reference and Name 4) Batch No. 5) Results of Chemical Analysis 6) Results of Mechanical Testing 7) Results of Electrical Conductivity Test 8) Results of Ultrasonic Testing 9) Results of Eddy Current Test or Surface Crack Test 10) Results of dimensional check 11) Consignment /Identification No.				
स्वतंत्राधिकार एवं गोपनीय इस प्रतीक में दी गई सूचना भारत की स्वतंत्राधिकार लिमिटेड की सम्पत्ति है। इसका प्रयोग या इस सूचना को किसी भी प्रकार प्रयोग में लाना बिना भारत की स्वतंत्राधिकार लिमिटेड की अनुमति के ग्राहक को न करना चाहिए।	15. PACKING AND MARKING: The material should be suitably packed in crates to prevent corrosion and damage during transit. Each package/crate shall be legibly marked with the following information: 1) BHEL Order No. 2) Spec. No. HW12199 3) Batch No. 4) Identification mark/No. 5) Weight 6) Supplier's reference and name.				
दिनांक एवं हस्ताक्षर SIGN & DATE 	REV. NO. 09				
आगामी सूची संख्या INVENTORY P-2264	निर्माणकर्ता WORKED BY NITIN BANSAL	जांचकर्ता CHECKED BY S.S. MEENA		13/2/25	

डिजाइन एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप : हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		HW12199 पृष्ठ 6 का 5 Page 5 of 6													
सुपरसेड्स INVENTORY NO सामग्री सूची संख्या को अधिकारित करता है	16. REJECTION AND REPLACEMENT: In the event of the material proving defective in the course of preparation, machining, testing etc. such material shall be rejected notwithstanding any previous certification of satisfactory in testing and/or inspection. The supplier shall undertake to replace the material free of charge without delay and arrange to take back the rejected material at his own cost.																
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.	17. LIMITATION: In this specification, minimum requirements applicable for approved suppliers of BHEL Haridwar / BHEL's Collaborator (i.e. Siemens Energy Inc.) are only included. First time suppliers shall also meet the process qualification requirement as per Clause No.18 of this specification.																
	18. PROCESS QUALIFICATION FOR FIRST TIME SUPPLIER: First-time supplier of Copper Wedges of material grade CuNi2Si+Zr shall: A. Provide confirmation to carry out testing as per BHEL specification TG40165 for process qualification at tendering stage. After receipt of order, Test Certificates of tests as per TG40165 shall be furnished to BHEL for process qualification. Bulk Manufacturing of slot wedges shall only be carried out after process qualification and written clearance by BHEL B. Submit following document along with technical offer: - Details of Manufacturing and Testing facilities available at their works for the production of these wedges. - Manufacturing, Inspection and Testing Plan for BHEL review and approval. - Details of the supplier from whom they are sourcing raw material along with Mill Test Certificate, (if applicable).																
स्वतंत्राधिकार एवं गोपनीयता इस प्रतीक में दी गई सूचना भारत भारती परमाणुमंत्रालय के समर्पित है। इसका प्रयोग एवं अप्रयोग रूप से किसी भी तरह का प्रयोग जो कि कंपनी के हित में हानिकारक हो न सके	19. CROSS REFERRED STANDARDS: - IS: 1608 - TG40106 - AA0850131 - DIN EN ISO 3452 - TG40165																
डिजाइन एवं हस्ताक्षर SIGN & DATE 	<table border="1"> <tr> <td data-bbox="204 1975 363 2065">REV. NO.</td> <td data-bbox="363 1975 826 2065">09</td> <td data-bbox="826 1975 986 2065">निर्माणकर्ता WORKED BY</td> <td data-bbox="986 1975 1209 2065">NITIN BANSAL</td> <td data-bbox="1209 1975 1353 2065"></td> <td data-bbox="1353 1975 1487 2065">13/2/25</td> </tr> <tr> <td data-bbox="204 2065 363 2145"></td> <td data-bbox="363 2065 826 2145"></td> <td data-bbox="826 2065 986 2145">जांचकर्ता CHECKED BY</td> <td data-bbox="986 2065 1209 2145">S.S. MEENA</td> <td data-bbox="1209 2065 1353 2145"></td> <td data-bbox="1353 2065 1487 2145">13.2.25</td> </tr> </table>					REV. NO.	09	निर्माणकर्ता WORKED BY	NITIN BANSAL		13/2/25			जांचकर्ता CHECKED BY	S.S. MEENA		13.2.25
REV. NO.	09	निर्माणकर्ता WORKED BY	NITIN BANSAL		13/2/25												
		जांचकर्ता CHECKED BY	S.S. MEENA		13.2.25												
सामग्री सूची संख्या INVENTORY P-2264																	

डिजाइन एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप : हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP: HARIDWAR)		HW12199 पृष्ठ 6 का 6 Page 6 of 6	
समीचीन सूची संख्या एवं अतिरिक्तित संख्या है	SUPERSEDES INVENTORY NO.	Annexure-1 Sample for Through Thickness Notch Tensile Test Sample must be taken from the extrusion starting of the bar.			
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bhilai Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company		   Detail- Z			
स्वतन्त्राधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत में ही उपयोग के लिए है। इसका प्रयोग अन्य किसी भी उद्देश्य के लिए या इस दस्तावेज में दी गई सूचना को बिना अनुमति के किसी भी तृतीय पक्ष को प्रसारित करने से निषेध है।					
डिजाइन एवं हस्ताक्षर SIGN & DATE					
समीचीन सूची संख्या INVENTORY	P-2264	REV. NO. 09	निर्माणकर्ता WORKED BY	NITIN BANSAL	 13/2/25
			जांचकर्ता CHECKED BY	S.S. MEENA	 13.2.25