

MATERIAL DESCRIPTION & SPECIFICATION (Catalogue):-

Enquiry Schedule No.	Item Detail	BHEL Material code	Project Details
1.	Slot Angle Drg: 21360501110 Rev-03 Spec: TG60046 Rev-07	W98413605022	NTPC Talchar: 180 Nos NPCIL GHAVP: 180 Nos
2.	Bottom Packing Spec: TG60046 Rev-07 Size: 1.4X41X6726+2 Dim.: TXWXL	W98413603593	NTPC Talchar: 90 Nos NPCIL GHAVP: 90 Nos
3.	Bottom Packing Spec: TG60046 Rev-07 Size: 1.4X38X6726+2 Dim.: TXWXL	W96413603607	NTPC Talchar: 90 Nos NPCIL GHAVP: 90 Nos

S No	Tender Term and Condition	Confirmation from bidder
General Requirements		
1.	Bidder to provide the documents as per pre-qualification requirements (PQR).	
2.	Bidder who fails to qualify Pre-qualification requirement, their offer will not be considered for technical evaluation and price bid opening part (part -2 of this tender).	
3.	NTPC un-approved vendor(s) to submit credentials in NTPC sub-supplier questionnaire format for take up with NTPC for approval. Vendor to confirm to follow NTPC approval condition (if any).	
4.	Ordering will be done on NTPC approved vendor(s) only as well as Price Bid (Part-II) will be opened only of those bidder(s) who qualify Part-1 bid (PQR), whose techno-commercial bid is acceptable to BHEL and who gets approve by end customer/NTPC before price bid opening.	
5.	Bidder to confirm that their quoted unit price in this tender is all-inclusive of basic rate, freight, insurance, packing & forwarding charges & any other charges if applicable + applicable GST.	
6.	Bidder to inform % of GST.	
7.	Term and condition shall be as per GeM T&C and GEM tender.	
9.	Confirm that there is no deviation with respect to BHEL Specifications. However, deviations, if any, are to be listed as a separate attachment. The offers that do not meet the substantial requirements of our enquiry are liable to be ignored. The bidders shall be deemed to comply with all the requirements of bidding documents except for listed deviations without any extra cost irrespective of any mention to the contrary anywhere else in the bid.	

QUALITY REQUIREMENTS		
1.	Vendor to submit Test Certificate (TCs) as per BHEL Specifications & QAP along with dispatch documents at the time of supply.	
2.	Vendor to submit Guarantee Certificate for a period of 12 months from the date of supply, along with dispatch documents at the time of supply.	
3.	Pre-Inspection will be done by BHEL/BHEL nominated inspection agency Intertek & end customer (if applicable) as per BHEL specification & NTPC approved QAP (For NTPC project) / BHEL SQP "QA/BE/QP/076 Rev-05" (for NPCIL Project).	

Important Instruction to bidders.

1. Following attachment with this Catalogue for tender preparation.
 - Pre-qualification requirement (PQR)
 - FCA
 - BHEL SQP "QA/BE/QP/076 Rev-05"
2. All supporting document shall be sign and stamped by bidder.
3. FCA is required to be signed & stamped on every page after filling relevant details. Other cross referred documents (Specifications &/or Drawings) can be obtained by email duly signed & Stamped FCA to bharat-b@bhel.in &/or puneet.krishna@bhel.in.

PRE-QUALIFICATION REQUIREMENTS (TECHNICAL) FOR
Slot Angle & Bottom Packing (TG60046)

INTRODUCTION: The Rotor Slot Angle is a L-type profile used as rotor slot insulation in rotor winding of Turbo Generators. The slot angles shall be manufactured from Epoxy glass cloth with a layer of Nomex paper sandwiched in between. The slot angles have a temperature index of 155°C. There are two types of slot angles Type A (L-type) & Type B (Club footed L-type). Bottom Packings are rectangular strips of same construction as that of Slot Angles.

1. **EXPERIENCE:** The vendor should be a manufacturer (OEM) or OEM's Authorized Distributor / Channel Partner / Sister Concern / Group Company, with OEM having the experience of successfully manufacturing and supplying the Rotor Slot Angles to OEMs of Turbo-Generators of capacity 200MW and above. In support of which, vendor to submit the following documents: -
 1. Unpriced Copy of two successfully executed purchase orders for above Slot Angle manufactured by above process and raw material for application in Turbo-Generator of capacity 200MW and above., of which at least one P.O. should be of the material supplied during last seven years from date of enquiry.
 2. Copy of Test Certificates (for dimensional, mechanical and electrical test, etc.) for the above Slot Angle corresponding to anyone of purchase order (not more than seven years old) submitted against clause no 1.1.
 3. Documentary evidence of acceptance of material, pertaining to purchase order for which TC has been submitted.
2. **MANUFACTURING FACILITIES:** Vendor/OEM to confirm that they have all in-house manufacturing facilities for above Rotor Slot Angle meeting the requirements as per BHEL specification TG60046 rev 07.
3. **TESTING FACILITIES:** Vendor/OEM to confirm that they have in-house test facilities, sufficient to carry out all the test as per enquired specification TG60046 rev 07. In case vendor conducts test at an external testing agency, vendor to furnish the details of the same, e.g. NABL accredited/Government approved Lab.
4. Vendor to provide the product technical datasheet or details/TC of raw materials being required for manufacturing the enquired item.
5. Vendor to confirm the detailed technical requirements given in the enquired specification and drawing (if any).
6. Vendor who is supplying this item to BHEL for the first time have to submit one set of samples (Size & Quantity given in Table -1) for testing the material as per Clause 6.0 of per specification TG60046 rev 07. Vendor will be qualified on the basis of successful laboratory evaluation of samples as per specification TG60046 Rev 07, in addition to qualifying other requirements of PQR.

TABLE - 1			
S.no	Test	Size(in mm)	Quantity
1	Density	Length/Width/Thickness = 20/20/1.4 mm	3
2	Glass content (for 1.4mm thick sided slot angle)	Length/Width/Thickness = 50/50/1.4 mm	3
3	Tensile Strength	Dimensions as per ISO527-2 (Type 1 B)	5
4	L Strength @RT & 150°C*	15 mm wide strip along the width of the Slot Angle	10
5	Electrical Strength	Length/Width/Thickness = 150/150/1.4 mm	3
6	Electrical Strength in Bent state	Length/Width/Thickness = 135/80/1.4 mm	3
7	Glass transition temperature by DSC	Length/Width/Thickness = 35/15/1.4 mm	3

(NITIN RAO)
 Manager / ISE&CPL

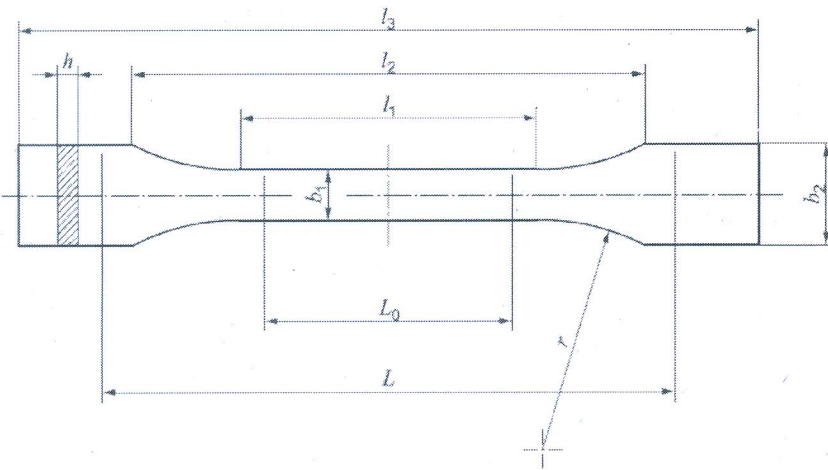
Shivangi
 11/01/23
 Sr. Manager
 E3/EME

ASHA GUPTA
 Sr. DM - EME

Anand Kumar
 11/01/23
 Sr. DM (IG, CPL, SRI)

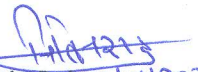
Tensile Strength Test Specimen Dimensions (Type 1B):


	Specimen type	1A	1B
l_3	Overall length ^a	170	≥ 150
l_1	Length of narrow parallel-sided portion	80 ± 2	$60,0 \pm 0,5$
r	Radius	24 ± 1	$60 \pm 0,5$
l_2	Distance between broad parallel-sided portions ^b	$109,3 \pm 3,2$	$108 \pm 1,6$
b_2	Width at ends	$20,0 \pm 0,2$	
b_1	Width at narrow portion	$10,0 \pm 0,2$	
h	Preferred thickness	1.4	
L_0	Gauge length (preferred)	$75,0 \pm 0,5$	$50,0 \pm 0,5$
	Gauge length (acceptable if required for quality control or when specified)	$50,0 \pm 0,5$	
L	Initial distance between grips	115 ± 1	115 ± 1





NOTE

- BHEL reserves the right to verify the information submitted by the vendor. In case the information is found to be false or incorrect, the offer shall be rejected.
- All the documents should be furnished in English language only. If the document provided by vendor is in any language other than English, it must be supported with its certified English translation.
- In case vendor is Authorized Distributor / Channel Partner / Sister Concern / Group Company, experience e/manufacturing & testing facilities of OEM may also be considered.


Nitin Raj 11/01/2023
Manager / ISE & CPL


11/01/23
Sg. Mgt/EME


11/01/23
SDGM / EME


11/1/23
Anirudha Tijare
AGM / ISE, CPL & GRI

MANUFACTURER'S NAME AND ADDRESS			QUALITY PLAN									
BHEL		ITEM	Rotor Slot Angle	QP NO.	QA/BE/QP/076							
				REV	05							
		DRG. NO.	AS PER PO		Page 1 of 2							
SPEC.	TG60046 Rev. 07											
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	D	10		11

1.	Raw material Inspection	1) Glass Epoxy Prepregs												
		Grammage	Major	Physical	1 Roll from each batch/lot	BHEL SPEC & Drg.	BHEL SPEC & Drg.	Supplier TCs	√	P	V	-		
		Thickness	Major	Physical		BHEL SPEC & Drg.	BHEL SPEC & Drg.		√	P	V	-		
		Glass content	Major	Chemical		BHEL SPEC & Drg.	BHEL SPEC & Drg.		√	P	V	-		
		2) Nomex paper 410												
		Thickness	Major	Physical	1 Roll from each batch/lot	BHEL SPEC & Drg.	BHEL SPEC & Drg.	Supplier TCs	√	P/V	V	-		
		Grammage	Major	Physical		BHEL SPEC & Drg.	BHEL SPEC & Drg.		√	P/V	V	-		
		Dielectric strength	Major	Electrical		BHEL SPEC & Drg.	BHEL SPEC & Drg.		√	P/V	V	-		
Tensile strength (MD)	Major	Mechanical		BHEL SPEC & Drg.	BHEL SPEC & Drg.		√	P/V	V	-				
2.	In process/ Final Inspection (Physical Properties)	Thickness (SA, BP& SC)	Critical	Physical	For each slot angle	BHEL SPEC & Drg.	BHEL SPEC & Drg.	Test Certificates	√	P	W*	-		
		Long leg width (SA, BP& SC)	Critical	Physical	For each slot angle	BHEL SPEC & Drg.	BHEL SPEC & Drg.	TCs	√	P	W*	-		
		Short leg width (SA, BP& SC)	Critical	Physical	For each slot angle	BHEL SPEC & Drg.	BHEL SPEC & Drg.	TCs	√	P	W*	-		
		Length (SA, BP& SC)	Critical	Physical	For each slot angle	BHEL SPEC & Drg.	BHEL SPEC & Drg.	TCs	√	P	W*	-		
		Straightness (SA)	Critical	Physical	For each slot angle	BHEL SPEC & Drg.	BHEL SPEC & Drg.	TCs	√	P	W*	-		
		Density (SA, BP& SC)	Critical	Physical	2 slot angles per lot	BHEL SPEC & Drg.	1.55 ± 0.1 gm/ cc	TCs	√	P	W	-		

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

Digitally signed by Nishant Kumar
Date: 2021.09.01
14:03:19 +05'30'

MANUFACTURER'S NAME AND ADDRESS			QUALITY PLAN										
BHEL		ITEM	Rotor Slot Angle	QP NO.	QA/BE/QP/076								
				REV	05								
		DRG. NO.	AS PER PO		Page 2 of 2								
SPEC.	TG60046 Rev. 07												
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS		AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	D	10			11

		% Shrinkage (SA)	Critical	Physical	2 slot angles per lot	BHEL SPEC & Drg.	<2 mm in length. No dimensional variation, No deformation after subjected to heating 160 °C for 6 Hrs.	TCs	√	P	W	-	
		Metal /inclusion (SA, BP& SC)	Critical	Physical	For each slot angle	BHEL SPEC & Drg.	Free from Metal/Foreign Particles(Calibrate Metal detector for 10 mg metal for Minimum detection)	TCs	√	P	W*	-	
3.	Composition	Glass Fabric content (SA, BP& SC)	Critical	Chemical	2 samples per lot	BHEL SPEC & Drg.	50 ± 5%	TCs	√	P	W	-	
4.	Mechanical Properties	Tensile strength (SA)	Critical	Mechanical	2 samples per lot	BHEL SPEC & Drg.	≥170 N/mm2	TCs	√	P	W	-	
		L- strength (SA & SC)	Critical	Mechanical	2 samples per lot	BHEL SPEC	BHEL SPEC	TCs	√	P	W	-	
		Visual inspection (SA, BP& SC)	Major	Visual	For each slot angle	BHEL SPEC & Drg.	BHEL SPEC & Drg.	TCs	√	P	W*	-	
5.	Electrical Properties	1min proof voltage test (SA)	Critical	Electrical	For each slot angle	BHEL SPEC & Drg.	12 KV	TCs	√	P	W*	-	
		Electrical strength in Bent state (SA)	Major	Electrical	2 samples per lot	BHEL SPEC & Drg.	≥ 10 KV	TCs	√	P	W	-	
6.	Thermal Properties	Glass transition temperature (SA, BP& SC)	Major	Thermal	2 samples per lot	BHEL SPEC	≥160 °C	TCs	√	P	V	-	
7.	Identification Marking & Dispatch	Identification	Minor	Visual	For each slot angle	BHEL SPEC & Drg.	BHEL SPEC & Drg.	TCs	√	P	W	-	
		Test certificate	Minor	Doc. Review	For each supply	BHEL SPEC & Drg.	BHEL SPEC & Drg.	TCs	√	P	V	-	
		Packing	Minor	Doc. Review	For each slot angle	BHEL SPEC & Drg.	BHEL SPEC & Drg.	TCs	√	P	-	-	

Abbreviation:

SA: Slot Angle, BP: Bottom Packing, SC: L-shape Small components.

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

Digitally signed by
Nishant Kumar
Date: 2021.09.01
14:03:36 +05'30'

