

TECHNICAL SPECIFICATION OF CNC INSULATION TAPING MACHINE

TECHNICAL SPECIFICATION NO. EMT- 6728 REV. 00

SL. NO	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
1.0	PURPOSE :				
	CNC Insulation Taping machine will be used for insulation of stator winding bars of Turbogenerator of capacity upto 1000 MW.				
2.0	SCOPE OF SUPPLY :				
	The scope of supply includes design, manufacturing, supply, <u>erection, commissioning and job proving</u> of the performance of the CNC Insulation Taping Machine at BHEL Haridwar works.	01 no.			
3.0	DETAILS OF STATOR WINDING BAR OF TURBOGENERATOR CAPACITY UPTO 1000 MW :				
3.1	Cross Section of insulated bar				
3.1.1	Maximum : 60 X 140 mm				
3.1.2	Minimum : 15 X 40 mm				
3.2	Length of stator winding bar :				
3.2.1	Straight Length : Maximum 8700.00 mm; Minimum = 1600.00 mm				
3.2.2	Overall length of stator winding bar : Maximum 11000.00 mm; Minimum = 3000.00 mm				
3.3	Involute Angle : Maximum : 20 Degree Minimum : 11 Degree				
3.4	Weight of stator winding bar : Maximum 175.00 kg; Minimum 30.00 kg				
4.0	TECHNICAL SPECIFICATION OF CNC INSULATION TAPING MACHINE :				
4.1	Taping head	01 no.			
4.1.1	X -axis travel = 11,000.00 mm				
4.1.2	Y - axis travel = 1600.00 mm				
4.1.3	Z - axis travel = 600.00 mm				
4.1.4	Rotation A -axis = 360 degree				

4.1.5	Tilting B-axis : + / - 75 degree				
4.1.6	Swivel C-axis : 360 degree (Software upto + / - 85 degree)				
4.2	Gantry Crane	01 no.			
4.2.1	Gantry Crane for supporting and positioning of closed taping ring (Sl. no. 4.3) on cross carriage, moveable along the machine X-axis on rails complete with linear guides, dust stripper with grease nipples. Cross carriage supported on gantry crane, is displaceable in cross direction (Y-axis) and also vertical movement of closed taping ring on Z-axis				
4.3	Closed Taping Ring	01 no.			
4.3.1	Taping ring in which two electrically constant tension controlled tape rolls rotate in A-axis (Sl. no. 4.1.4) shall have suspended cross carriage with Z-axis movement and be able to tilt in B-axis (Sl. no. 4.1.5) and swivel in C-axis (Sl. no. 4.1.6). The closed taping ring shall be complete with tape break / tape end control device and automatic device to change the tape angle.	Vendor to furnish the details in the offer			
4.3.2	The taping ring shall have following specifications.	Vendor to furnish the details in the offer			
4.3.2.1	Tape rolls diameter outer : 220.00 mm				
4.3.2.2	Tape roll diameter inner : 55.00 mm				
4.3.2.3	Cross-section of stator bar : Maximum = 60 X 140 mm, Minimum = 15 X 40 mm				
4.3.2.4	Width of insulating tape : 20/25/30/35 mm				
4.3.2.5	Tape Tension : 20 - 90 N				
4.3.2.6	Taping head rotation 0 - 300 rpm				
4.3.2.7	Tape Angle : + / - 13 Degree				
4.4	Bar Supports at straight portion :	09 nos.			
4.4.1	Pneumatically operated, automatically controlled in vertical direction for clamping the bar on straight portion. These supports are manually moveable along guided rail and detachable. Bar supports not required should be placed in a depot.	Vendor to confirm and submit the details in the offer			
4.5	Fixed End Support	01 no.			

4.5.1	End suport fixed along X-axis at one end and manoeverable in Y-axis and Z-axis. Stator bar is clamped on fixed support manually.	Vendor to submit the details in the offer			
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4.6	Moveable End Support :	01 no.			
4.6.1	Manually moveable end support is manoeverable in X, Y and Z -axis. One end of stator bar will be clamped on moveable end support manually.	Vendor to submit the details in the offer			
4.7	CNC Control and Control Panel :	01 set			
4.7.1	The operating panel shall be mounted on gantry crane and shall be complete with following major items -	Vendor to submit the details in the offer			
4.7.1.1	All controls shall be PC based				
4.7.1.2	One number INTEL make industrial PC with pen drive and USB port.				
4.7.1.3	Industrial PC is capable of storing not less than 100 nos. profiles of stator winding bars				
4.7.2	Screen station for touch screen operation, axis regulator prints, digital I/O etc., regulator prints for the drives, transformer fuse etc.				
4.7.3	Software package for the angle correction on B & C axes				
4.7.4	Software package for the correction of bar points				
4.8	TEACH - IN DEVICE :.	01 set			
4.8.1	TEACH- IN device for teaching the machine for the profile of bar, complete with setting probes etc.	Vendor to confirm and submit the details			
4.9	Air Conditioning Unit :	01 set			
4.9.1	Air Conditioning Unit for the control cabinets and operator's panel suitable for the machine to environment conditions as stated in Sl. no. 7.3 of this Technical Specification.	Vendor to confirm			
4.10	Air Compressor Unit :	01 no.			
4.10.1	Reputed and Indian make suitable capacity dedicated and effective air compressor unit should be supplied for the supply of dry and oil free compressed air for the function and control of the taping machine. Make and Technical Specification of air compressor is to be furnished in the offer.	Vendor to confirm and to submit the details			
4.10.1.1	Maximum noise level of air compressor should be below 85 dB(A), one meter away from the air compressor. Refer Sl. No. 7.4	Vendor to confirm			

4.11	Safety Light Barrier : Safety light barrier to be supplied to cover the entire length in front side of the machine.	01 set			
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5.0	GENERAL ARRANGEMENT DRAWING OF CNC INSULATION TAPING MACHINE :				
5.1	General arrangement drawing of the offered CNC insulation taping machine including the schematic sketch / technical leaflet / photograph of the machine, overall size and weight of the machine, requirement of total electrical power and compressed air etc. are to be furnished in the offer.	Vendor to submit the details			
6.0	OPERATIONAL & MAINTENANCE MANUAL OF CNC INSULATION TAPING MACHINE :				
6.1	Five sets of operational & maintenance manual in English language , will be supplied with the machine. Out of five sets, one set is to be supplied on CD ROM	Vendor to confirm			
6.2	NOTE : In addition to other information, O&M Manual should contain the following also :				
6.2.1	Machine operation manual	Vendor to confirm			
6.2.2	Service manual for machine	Vendor to confirm			
6.2.3	Operation and Maintenance manual of control system	Vendor to confirm			
6.2.4	Electrical and Pneumatic circuit diagram	Vendor to confirm			
6.2.5	Commissioning and interface manual of control system	Vendor to confirm			
6.2.6	Assembly drawing of taping ring, bar supports at straight portion, fixed end supports, moveable end support, cross carriage and gantry crane etc. and for all bought out items.	Vendor to confirm			
6.2.7	Drive controller manual	Vendor to confirm			
6.2.8	Installation and start up manual and programming manual of drive controller	Vendor to confirm			
6.2.9	Wiring diagram, connector / plug details, junction box and terminal board description	Vendor to confirm			
6.2.10	Process details for recording the bar geometry / profile and manual for teach - in - device	Vendor to confirm			
6.2.11	Spare parts list alongwith the specifications and address of the manufacturer	Vendor to confirm			
6.2.12	Alarm list and fault diagnostic manual	Vendor to confirm			
6.2.13	Detail technical specification of motor and built in encoder	Vendor to confirm			
6.2.14	Input and Output list	Vendor to confirm			
6.2.15	The complete software backup will be supplied on floppy / CD ROM	Vendor to confirm			
6.2.16	All necessary interlock description needed for maintenance of the machine will be supplied.	Vendor to confirm			
6.2.17	Details of the self diagnostic facilities available on the machine shall be supplied	Vendo to confirm			

6.2.18	Foundation and layout drawing of the machine	Vendor to confirm			
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7.0	POWER SUPPLY AND ENVIRONMENT CONDITION :				
7.1	BHEL will provide input power supply 3 phase, 3 wire, 415 + / - 10% volt, 50 + / - 3% Hz to Isolator switch (BHEL Scope) nearby main control panel of machine. Cable connections from isolator switch to control panel and remaining cabling / wiring for the machine and other auxiliaries / equipment, will be in the scope of vendor. There will be no neutral wire and earthing will be provided through shop structure column	Vendor to confirm			
7.2	Reputed Indian make Isolation Transformer cum Voltage stabilizer to be supplied to counter the electrical supply as per Sl. no. 7.1 above	Vendor to confirm			
7.3	Environment Condition :				
	Machine should be suitable for tropical condition with ambient temperature from 0 to 50 degree Centigrade and relative humidity maximum 96 %	Vendor to confirm			
7.4	Noise Level :				
7.4.1	Maximum noise level of the main machine and Air Compressor Unit (Sl. no. 4.10) should be below 85 dB(A) at normal operation, one meter away from the machine with correction factor for background noise.	Vendor to confirm			
7.4.2	Vendor will demonstrate the noise level as per international standard like DIN 45635-16, if asked for.	Vendor to confirm			
8.0	OTHER ESSENTIAL ITEMS :				
	Full description along with the quantity and price of the items not covered at Sl. No. 4.1 to 4.11 above but are essential for operation & control, installation, commissioning of the CNC Insulation Taping Machine, shall be offered.	Vendor to confirm and submit the details			
9.0	SPARES (OPTIONAL) :				
	Set of spares required for 2 years trouble free operation of the CNC Insulation Taping Machine, is to be offered	Vendor to confirm			
9.1	Mechanical	Vendor to submit the details			
9.2	Electrical	Vendor to submit the details			
9.3	CNC and Electronics	Vendor to submit the details			
9.4	Pneumatic	Vendor to submit the details			
9.5	Detailed item wise-price list of the spares along with the name and address of suppliers for all bought out items to be offered against each of the above categories along with quantity recommended.	Vendor to submit the details			

9.6	Vendor will furnish offer validity of two years for the spares after commissioning of the CNC Insulation Taping Machine at BHEL Haridwar.	Vendor to confirm			
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10.0	PAINTING :				
10.1	CNC Insulation Taping Machine and control panel shall be painted by RAL 7038 Grey paint or mutually agreed.	Vendor to confirm			
10.2	NOTE : Vendor will repair the paint with original paint in case the same is damaged in transit / erection, before commissioning the CNC Insulation Taping Machine.	Vendor to confirm			
11.0	PRE-ACCEPTANCE OF CNC INSULATION TAPING MACHINE AT VENDOR'S WORKS :				
11.1	Pre-acceptance of CNC Insulation Taping Machine will be done by BHEL engineers deputed for training (Sl. No. 12.0) at vendor's works. Vendor shall arrange for the materials for dummy demonstration of the operation and control of the machine and certify the completeness of the machine.	Vendor to confirm			
12.0	TRAINING :				
12.1	Training of three BHEL engineers at vendor's works for 2 weeks to each person as below, will be given.	Vendor to confirm			
12.1.1	Operation of CNC Insulation Taping Machine	Vendor to confirm			
12.1.2	Mechanical / Pneumatic maintenance of the CNC Insulation Taping Machine	Vendor to confirm			
12.1.3	Electrical and Electronics maintenance of CNC Insulation Machine	Vendor to confirm			
12.2	Vendor shall quote for the charge of training if any, per man & per day basis	Vendor to confirm			
13.0	FOUNDATION OF THE CNC INSULATION TAPING MACHINE				
13.1	Vendor shall submit the preliminary machine layout drawings for getting BHEL approval within two months of Purchase Order.	Vendor to confirm			
13.2	After BHEL approval of preliminary layout drawings, foundation plan of CNC Insulation Taping Machine giving load points and final layout drawings shall be submitted by the vendor with in next two months i.e. 4 months from the date of issue of Purchase Order. Layout of cable trenches will be included in the foundation plan.	Vendor to confirm			
13.3	Special grouting material if any, the same shall be supplied by the vendor along with the CNC Insulation Taping Machine.	Vendor to confirm			
13.4	Civil foundation will be prepared by BHEL as per approved vendor's foundation drawing under the supervision of vendor's representative	Vendor to confirm			

14.0	ERECTION & COMMISSIONING OF THE CNC INSULATION TAPING MACHINE AT BHEL WORKS :				
14.1	Erection of the machine will be carried out by the Vendor. The vendor shall take full responsibility for carrying out the erection and start up of the machine. BHEL shall provide required manpower. The commissioning of the CNC Insulation Taping Machine at BHEL works, will be done by the vendor. BHEL will provide input power supply 3 phase, 3 wire, 415 +/- 10% volts, 50 +/- 3 % Hz to the machine at single point as per sl. no. 7.1. Any special instrument (s) / Tooling / Measuring Devices etc. if required, for erection of the machine, to be brought by the vendor. NOTE :- EOT crane 3 Ton capacity available in the section of the shop, where the machine will be erected. Representative of vendor shall hire mobile crane from local sources. Compressed air pressure available in BHEL shop, is in the order of 3.0 Kg/ centimeter square.	Vendor to confirm			
15.0	JOB PROVING AND FINAL ACCEPTANCE OF THE CNC INSULATION TAPING MACHINE AT BHEL WORKS :				
15.1	Final acceptance of CNC Insulation Taping Machine shall be made at BHEL Hardwar works after completion of following activities				
15.2	Successful insulation taping of minimum 6 nos. of stator winding bar	Vendor to confirm			
15.3	Demonstration of all features of CNC Insulation Taping Machine, its control system to the satisfaction of BHEL	Vendor to confirm			
	NOTE : Separate price if any, is to be indicated in the commercial bid of the offer, for proving of the CNC Insulation Taping Machine at BHEL works.	Vendor to confirm			
16.0	GUARANTEE :				
	Guarantee for complete CNC Insulation Taping Machine and all auxiliaries , for 12 months from the date of job proving and final acceptance of the machine (Sl. no. 15.0) .	Vendor to confirm			
17.0	QUALITY PLAN :				
	Vendor shall submit Quality Plan within one month after issue of LOI or Purchase Order which one is earlier.	Vendor to confirm			
18.0	PACKING :				
	Sea worthy and rigid WOODEN BOX packing for all the other supplied items to avoid any damage / loss in transit. All small and loose items like spares etc., should be suitably marked and packed in wooden boxes.	Vendor to confirm			

19.0	GENERAL INFORMATION :				
	All the information stated in tender document, are exclusive property of BHEL Hardwar. Under any circumstances these information as stated above, must not be passed on to any third party without prior permission of BHEL and must not be used directly or indirectly, which may be detrimental to the interest of BHEL.	Vendor to confirm			
20.0	QUALIFYING CONDITIONS :				
	Offer of only those vendors will be considered who have supplied and commissioned at least one number such CNC Insulation Taping Machine in last ten years and it is working satisfactorily for at least one year after commissioning the machine. In case, similar machine is supplied to BHEL, it should be working satisfactorily for atleast 6 months after commissioning of the machine. Supporting documents like copy of purchase order / performance certificate from the customer, is to be submitted along with the offer.	Vendor to submit the details			
20.1	i) Name of the company / customer, where such CNC Insulation Taping Machine (s) is (are) installed	Vendor to submit the details			
20.2	ii) Complete postal address of the company / customer	Vendor to submit the details			
20.3	iii) Year of commissioning	Vendor to submit the details			
20.4	iv) Application for which the machine is installed	Vendor to submit the details			
20.5	v) Name and designation of the contact person of the company / customer	Vendor to submit the details			

