

						
	<u>BHARAT HEAVY ELECTRICAL LIMITED</u>				Enquiry No. :	
	<u>UNIT'S ADDRESS:</u>				Due Date :	
	<u>CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL (FROM PURCHASE DEPT.)</u>				Supplier Qtn. No.:	
					Date :	

SPECIFICATION CUM COMPLIANCE CERTIFICATE OF PLC COIL PULLING MACHINE

NOTE:-

1. Vendor must submit complete information against clause no. 15 (Qualifying Conditions) The offer meeting this clause would only be processed.
2. The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.
3. The offer and all documents enclosed with offer should be in English language only.

NAME & ADDRESS OF THE SUPPLIER :

NAME & ADDRESS OF THE INDIAN AGENT :

TELEPHONE NOS.:

TELEPHONE NOS.:

FAX NOS.:

FAX NOS.:

E-MAIL ADDRESS :

E-MAIL ADDRESS :

SCOPE: SUPPLY, ERECTION & COMMISSIONING OF PLC COIL PULLING MACHINE COMPLYING WITH SPECIFICATION AS BELOW.

SNO	DESCRIPTION FOR BHEL REQUIREMENT		SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
1.0	PURPOSE					
1.1	This specification is for Programmable Automatic Coil Pulling Machine for forming diamond shape coils from straight loops & boat type loops for motors and generators.		Vendor to Confirm			
1.2	The scope of supply will include the basic machine with all controls, power supply and other interfacing cables and conduits, air conditioning and other tropicalising systems (Whereever required), set of special maintenance tools, fixtures and tools for trial coils, any other items as detailed in the paragraphs below.		Vendor to Confirm			
2.0	WORK PIECE MATERIAL					
	The machine is for spreading of coil loops of 3 phase AC motors and generators as per drawing to form diamond shaped coils. The dimensions of the coils should be achieved on the machine. Spring back allowance to be considered. The conductor hardness varies from 50HV to 65HV. The spring back correction should be accommodated in the program as per this range.		Vendor to Confirm			
2.1	<p>The major dimensions which should be achievable on the machine are :</p> <p>a) Slot length with cell margin (both coil sides).</p> <p>b) Slot exit radius (both coil sides).</p> <p>c) Opening angle between coils sides.</p> <p>d) Correct profile of end windings(Winding overhangs) with proper drum radius.</p> <p>e) Nose angle and Nose inside diameter.</p> <p>f) Overhang drop.</p>		Vendor to Confirm			

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2.2	The coil loops may be straight type or boat type (offset between sided).	Vendor to Confirm			
2.3	The diamond shaped coils can be for rotors (fitted on outside periphery) or for stators (fitted on inside periphery).	Vendor to Confirm			
2.4	The coils can be single turn or multi turn.	Vendor to Confirm			
2.5	The coils can also be skewed with a maximum skew offset of 10 ⁰ .	Vendor to Confirm			
3.0	SPECIFICATION				
	a) Coils cross section (Max.)	Vendor to Confirm			
	: 20 x 50 mm				
	b) Coils cross section (Min.)	Vendor to Confirm			
	: 5 x 10 mm				
	c) Length of Straight coil side (Max.)	Vendor to Confirm			
	(Straight part length).				
	: 1000 mm				
	d)Length of Straight coil side (Min.)	Vendor to Confirm			
	(Straight part length).				
	: 200mm				
	e) Length of coil loops before spreading	Vendor to Confirm			
	(Max.) (pin to pin dimension).				
	: 2100 mm				
	f) Length of coil loops before spreading	Vendor to Confirm			
	(Min.) (pin to pin dimension)				
	: 350 mm				
	g) Opening angle between coil sides.	Vendor to Confirm			
	(Max.)				
	: 150 ⁰				
	h) Opening angle between coil sides.	Vendor to Confirm			
	(Min.)				
	: 15 ⁰				
	i) Nose angle (Max.)	Vendor to Confirm			
	: 30 ⁰				

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	j) Nose angle (Min.)	: 0°	Vendor to Confirm			
	k) Diameter of coils nose holder (Nose pins) Nose holder at bend portion should have radius of 10 & 20 mm.	: 8,10,12,16,20,30 & 50 mm	Vendor to Confirm			
	l) Nose height (From the axis of the machine to nose centre. (Max.)	: 800 mm	Vendor to Confirm			
	l) Nose height (From the axis of the machine to nose centre. (Min.)	: 150 mm	Vendor to Confirm			
	m) Drum radius of coil. (Max.)	: 900 mm	Vendor to Confirm			
	m) Drum radius of coil. (Min.)	: 120 mm	Vendor to Confirm			
	n) Grippers at bending end should have radius of 10 mm, 15 mm, 20 mm , 30 mm,40 mm,50mm & 80 mm.		Vendor to Confirm			
	4.0 OPERATION AND CONTROLS SYSTEM					
4.1	The machines should be able to carry out the following sequence of operations:		Vendor to Confirm			
	a) Loading of coil.	(Manually)	Vendor to Confirm			
	b) Closing the nose clamps.	(Hydraulically / Electrically)	Vendor to Confirm			
	c) Closing the coil clamps.	(Hydraulically /Electrically)	Vendor to Confirm			

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	d) Automatic opening of the spreading arms.	(Hydraulically / Electrically)	Vendor to Confirm			
	e) Automatic bending of the nose angle.	(Hydraulically /Electrically)	Vendor to Confirm			
	f) Automatic shaping of the overhang.	(Hydraulically /Electrically)	Vendor to Confirm			
	g) Automatic opening of all clamps.	(Hydraulically /Electrically)	Vendor to Confirm			
	h) Unloading the coil.	(Manually)	Vendor to Confirm			
4.2	Cycle time for each coils covering all the above operations should not be more than 1 minute per coil.		Vendor to Confirm			
4.3	The machine setting should be automatic through program.		Vendor to Confirm			
5.0	ESSENTIAL FEATURES REQUIRED ON THE MACHINE :-					
5.1	The machine should be fully automatic with programmable controller. Only loading and unloading of the coils should be done manually. All other operations should be automatic and programmable. However, manual override and step by step operation should be possible.		Vendor to Confirm			
5.2	Change in coil size settings should not take more than 15 to 20 minutes including replacement of the fixtures.		Vendor to Confirm			
5.3	The programmable controller should have the capacity to store programs for 1000 type of coils. The program should cover all automatic operations and operator level settings should not be required.		Vendor to Confirm			
5.4	For any new type of coil, a visual / menu driven system should be available to feed the coil dimensions. The machine itself should generate programs for the new type of coil and set the machine.		Vendor to Confirm			

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5.5	The operator control should be provided as a movable top hanging panel.	Vendor to Confirm			
5.6	The working speed of the machine should be adjustable.	Vendor to Confirm			
5.7	The machine should have hydraulic / electric spreading arms which are individually controlled so that skewed type of coils with different angles can be produced.	Vendor to Confirm			
5.8	Working height of machine should be suitable for normal working.	Vendor to Confirm			
5.9	Grippers design should be such that there is no play during pulling operation.	Vendor to Confirm			
5.10	The machine operation should be very smooth with low noise level.	Vendor to Confirm			
5.11	Coils formation should be as per coil drg to avoid further correction on steel / wooden former.	Vendor to Confirm			
5.12	Single person should be able to operate the machine.	Vendor to Confirm			
5.13	The machine should have provision for Auto / Manual Working.	Vendor to Confirm			
5.14	Suitable overhang shaping tools to be provided to meet the requirement specified in the clause 4.1 f .	Vendor to Confirm			
6.0	ELECTRICALS & CONTROLS				
6.1	Complete electrical control panel to be fitted on one side of machine. All internal wiring should be from standard PVC copper wire.	Vendor to Confirm			
6.2	Electrical supply will be made available up to incoming isolator by BHEL and remaining wiring and cabling will be in the scope of supplier.	Vendor to Confirm			
6.3	All machine interface logic should be PLC based and operator interface through a suitable panel view / R. S. View / suitable OP display . The PLC should be Siemens, Allen Bradley / Mistubishi / Modicon make.	Vendor to Confirm			

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6.4	Application software, PLC S/W & operator interface, software shall be provided together with a latest IBM compatible notebook computer along with interface cable.	Vendor to Confirm			
6.5	List of essential spares for PLC and operator panel to be furnished.	Vendor to Confirm			
6.6	Automatic lubrication system should be provided.	Vendor to Confirm			
6.7	Hydraulics system should be Rexroth/ Vickers / Yoken make.	Vendor to Confirm			
7.0	DEMONSTRATION AND TRIALS				
7.1	Trials on two type of coils to be carried out on the machine at supplier works in presence of BHEL representatives. Necessary fixture etc. to be developed by the supplier for this. For this two numbers of each type of loops to be arranged by the supplier. The design of coils should preferably be for 2 or 4 pole VPI machine. Vendor may be include charges if any in their offer.	Vendor to Confirm			
7.2	After receipt of the machine at out works, the operations have to be further demonstrated and proved on some designs from our shop.	Vendor to Confirm			
8.0	SPARES				
8.1	Maintenance spares for two years operation should be supplied with the machine.	Vendor to Confirm			
9.0	DOCUMENTS TO BE SUPPLIED				
9.1	Operation manual (4 sets in English)	Vendor to Confirm			
9.2	Maintenance manual for the machine and maintenance manual supplied by OEMS of controllers and other subsystems.	Vendor to Confirm			
9.3	PLC & HMI programming manuals alongwith hard and soft copies of ladder diagram & HMI Programm to be provided.	Vendor to Confirm			
9.4	Electrical Circuit diagram of the system.	Vendor to Confirm			
9.5	Hydraulics diagram of the system.	Vendor to Confirm			

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9.6	Layout and outline drawing.	Vendor to Confirm			
9.7	4 Copies of test certificates and trial report.	Vendor to Confirm			
9.8	Drgs for Grippers & Nose block to be subitted with the machine.	Vendor to Confirm			
10.0	DETAILS TO BE FURNISHED WITH THE OFFER				
10.1	Clause by clause comments of this specification.	Vendor to Confirm			
10.2	General arrangement drawing should be sent indicating the following. a) Space requirement. b) Salient features of the machine. c) Hydraulic /Electric circuit diagram.	Vendor to Confirm Vendor to Confirm Vendor to Confirm			
10.3	Capacity of motor and starter.	Vendor to Confirm			
10.4	Safety devices included.	Vendor to Confirm			
10.5	List of customers using similar equipment.	Vendor to Confirm			
10.6	Essential Spares for 2 years consumption.	Vendor to Confirm			
11.0	ACCESSORIES : - Pulling head / pulling ring (quantity = 1 No.)	Vendor to Confirm			
12.0	PAINTING				
12.1	The equipment should be de - rusted with two coats of Red oxide primer and finished with putty, if required. It should finally be given one coat base primer and two coats by RAL 7038 (Grey) for machine RAL - 1023 (Yellow) for tapping ring.	Vendor to Specify			

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13.0	OPERATION & CONTROL SYSTEM				
13.1	PLC and HMI shall be Allen Bradely / MODICON / MITSUBISHI/ SIEMENS make only. (Make Model and details to be furnished)	Vendor to Specify			
14.0	ELECTRICAL SYSTEM				
14.1	415 - 10%, - 15%, 50Hz \pm 3 %, 3 phase AC (3 wire system with out neutral) Power Supply source will be provided by BHEL at a single point near the winding machine as per layout recommended by Vendor. All type of cables , connections, circuit breakers etc.required for connecting BHEL's power point to different parts of the pulling machine control cabinets. shall be the responsibility of vendor. Requirement of grounding / earthing with required material details to be informed by vendor well in advance so that same could be incorporated during construction of foundation Machine control supply to be of 220 V AC. Necessary isolation /step down transformers for machine control including CVT/UPS if required to be provided.	Vendor to Confirm			
14.2	Tropicalisation : All electrical / electronic equipment shall be tropicalized for 95% max. humidity and 50 ⁰ C ambient temprature.	Vendor to Confirm			
14.3	All electrical & eletronic control cabinets & panel should be dust and Vermin proof.	Vendor to Confirm			
14.4	All electrical components in the cabinets should be mounted on DIN Rail.	Vendor to Confirm			

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14.5	All electrical and electronic panel including operators's panel should be provided with fluorescent lamps for sufficient illumination and power receptacles of 220Volts, 5/15 Amp AC. All adapters /receptacles should have compatibility with indian equipments.	Vendor to Confirm			
14.6	Motor shall conform to IEX Standards.	Vendor to Confirm			
14.7	All cables moving with traversing equipment should be installed in Caterpillar/ Drag chain. Additionally, all the Cables trays, hoses,cable drag chain. Additionally all the Cable trays, hoses, cable drag chains etc required for laying of cables should be included in the offer.	Vendor to Confirm			
15.0	SAFETY ARRANGEMENTS :				
	Following safety features in addition to other standard safety features should be provided for the Pulling Machine and auxiliaries : (Complete description of safety features should be furnished).				
	1) Pulling Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, workpiece and the operator due to the malfunctioning or mistakes. Pulling machine functions should be continuously monitored an alarm / warning indications through lights (on control Panels) / alarm number with message (on HMI Display) should be available. A fencing with proper interlock arrangement has to be provided to avoid accident by moving parts of the machine.	Vendor to Confirm			

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	2) A detailed list of all alarms/ indications provided on Pulling Machine should be submitted by the supplier.	Vendor to Confirm			
	3) All the pipes, cables etc. on the Pulling machine should be well supported and protected.	Vendor to Confirm			
	4) All the rotating parts used on Pulling machine should be statically & dynamically balanced to avoid undue vibrations. All rotating parts should be provided with suitable guards.	Vendor to Confirm			
	5) Emergency Switches at suitable location as per international norms are to be provided.	Vendor to Confirm			
16.0	ENVIRONMENTAL PERFORMANCE				
	The Pulling machine shall conform to following factors related to environment:				
	a) Maximum noise level shall be 85 db(A) at normal load condition. 1 M away from the pulling machine with correction factor for back ground noise, if necessary. This will be measured as per international standards like DIN 45635 - 16. Supplier to demonstrate compliance to noise level, if so required.	Vendor to Confirm			
	b) If any safety / environmental protection enclosure is required it should be built in the Pulling machine by the vendor.	Vendor to Confirm			
	c) Paint of the Pulling machine should be heat resistant and should peel off.	Vendor to Confirm			
17.0	LEVELING & ANCHORING SYSTEM				

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17.1	Complete anchoring system including foundation bolts, anchoring materials, fixtures, leveling shoes shall be supplied for the Pulling machine and all allied equipment.	Vendor to Confirm			
18.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE				
19.0	FOUNDATION :				
	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of letter of intent (LOI) / P.O. Complete Foundation Design including details, like Static / Dynamic load details etc. and final Layout Drawings shall be submitted by the supplier within three months after getting BHEL's approval. The Layout should consist of all requirements pertaining to complete plant and all accessories, including space requirement .BHEL will construct complete foundation for all the machine after receipt of complete foundation drawing from the vendor. The vendor shall also indicate detailed specifications of grouting compound and grouting procedure etc. for foundation bolts of various items of the plant.	Vendor to Confirm			
20.0	ERECTION & COMMISSIONING				
20.1	Supplier to take full responsibility for carrying out the erection. Start up , testing of machine , it's control system & all other supplied equipment. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by supplier in their foundation / layout drawing . Other requirements like crane and helping personnel shall also be provided by BHEL. Details of these requirements should be informed by vendor in advance.	Vendor to Confirm			

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20.2	Successful proving of BHEL components by supplier shall be considered as part of commissioning. All tests, as mentioned at Clause 21-23 (Machine acceptance) shall form part of the commissioning activity.	Vendor to Confirm			
20.3	Tools, Tackles, instruments and other necessary equipment required to carry out all above activities should be brought by the supplier.	Vendor to Confirm			
20.4	Commissioning spares, required for commissioning of the plant within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to Confirm			
20.5	Portion, if any, of the machine ,accessories and other supplied items where paint has rubbed off or peeled during transit on erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose , the vendor should supply sufficient quantity of touch - up paint of various colours of paint used.	Vendor to Confirm			
20.6	Laying of pipelines, fittings, interconnecting cables ; fixing and interconnection of the instruments sensors including impulse lines: shall form part of the erection to be carried out by vendor.	Vendor to Confirm			
20.7	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to Confirm			
20.8	Charges, duration, terms & condition for E & C should be furnished in detail separately by vendor along with offer.	Vendor to Confirm			

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21.0	ACCURACY TESTS :				
21.2	Accuracy test for required insulation Pulling time cycle for the parameters mentioned in the specification shall be done and the equipment supplied should be proved for the required parameters.	Vendor to Confirm			
22.0	PROVING OF BHEL COMPONENTS :				
	Drawing / details of proveout components are enclosed. Vendor to submit preliminary process, time study recommended by them along the offer. Complete prove out shall be done by Vendor at BHEL works to the specified process accuracy. Component for proveout - shall be provided by BHEL. Vendor should submit - settings, Process sheets, time studies etc. in advance for the prove out components. Vendor shall be fully responsible for proveout components as per requirements (150 Nos.) to the full satisfaction of the BHEL. Clarifications, if any ,required by vendor ,regarding accuracy requirements of the proveout components, whether specified or not. Should be discussed and cleared by vendor during initial technical discussion. Vendor to prove the process - time committed.	Vendor to Confirm			
23.0	MACHINE ACCEPTANCE: (Tests/Activities should be Performed by Vendor)	Should be accepted & confirmed by Vendor			
23.1	Tests/Activities to be carried out at supplier's works on the machine before dispatch in presence of BHEL representatives.				
23.1.2	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.				
23.1.3	Demonstration of all features of the machine, control system & accessories				
23.2	Tests/Activities to be carried out at BHEL works while commissioning the machine :				
23.2.1	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.				

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23.2.2	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine				
23.2.2	Two weeks supervision of independent operation of machine by BHEL after job proveout				
23.2.3	Training of BHEL machine operators in operation of complete machine & accessories etc by the supplier's experts / engineers during their stay at BHEL works				
23.2.4	Demonstration by actual use of all supplied attachments and accessories to their full capacity.				
24.0	PACKING				
24.1	Sea worthy & rigid packing for all items of the machine and control system, all Accessories and other supplied items to avoid any damage / loss in transit. When the equipment is despatched in containers, all small loose items shall be suitably packed in boxes.	Vendor to Confirm			

