BHARAT HEAVY ELECTRICAL LIMITED
Centralised Stamping Unit
Bharat Heavy Electricals Limited
Industrial Area jagdishpur, District: Sultanpur
CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL (FROM PURCHASE DEPTT

Enquiry No. :
Due Date :
Vendor
Quotation No.:
Date :

SECTION IV

SPECIFICATION CUM COMPLIANCE CERTIFICATE FOR TANDEM NOTCHING LINE

Specification No: BHEL/CSU/TS_TNM_R0

NOTE:-

1. Vendor must submit complete information against Qualification Criteria mentioned against clause no 39 of this technical specification. 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,
3. The offer and all documents enclosed with offer should be in English language only.

NAME & ADDRESS OF THE VENDOR :

NAME & ADDRESS OF THE INDIAN AGENTS (If Any) :

TELEPHONE NOS.:

TELEPHONE NOS.:

FAX NOS.:

FAX NOS.:

E-MAIL ADDRESS :

E-MAIL ADDRESS :

DUNS NO.(Of Duns & Bradstreat of USA)

SCOPE: Design, Manufacture,inspection and testing at vendor's works, packing forwarind & supply, Installation & commissioning, training and proving of Tandem Notching Line complying the specification as below.

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
1	**PURPOSE & WORKPIECE MATERIAL**				
1.1	The Tandem Notching Line shall be capable of notching circular blanks of electrical sheet steel(e.g. CRNGO SHEET STEEL-Gr: 350 having Tensile Strength 530 N/Sq. mm) for stator and rotors of rotating electrical machines. It shall have CNC controls for the three axes. Loading and unloading of the blanks shall be Automatic on to the different stations.	Vendor to confirm			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
1.2	The capacity of Press, size of table, slide and throat has been finalized based on the data of stampings which are proposed to be manufactured on the notching machine. A partial list of such large stampings is given as annexures attcahed to the last of specification. The Vendor shall check and confirm that it will be possible to manufacture these stampings on the proposed Tandem Notching Line.	Vendor to confirm Drg No. 24026240735 Drg No. 24026240768 Drg No. 24028141450 Drg No. 24036240047 Drg No. 24038140133 attached			
2	**SPECIFICATION:**				
2.1	**Tandem Notching Line consisting of following:**	Vendor			
2.1.1	Tandem Line with 8 stations consisting of two CNC Notching Machines and One Hydraulic Press for shaft hole punching in automatic operation, to produce stator and rotor laminations in one set up.	Vendor			
2.2	**Operation Sequence:**				
2.2.1	Station 1: - Destacking of blanks	Vendor			
	Station 1: - Centering of blanks according to keyway or drive pin hole	Vendor			
2.2.2	Station 2: - Centering of blanks according to shaft hole	Vendor			
	Station 2: - Orientating of blanks according to keyway or drive pin hole	Vendor			
2.2.3	Station 3: - Notching of stator and separating of rotor	Vendor			
2.2.4	Station 4: - Depositing of stator laminations	Vendor			
2.2.5	Station 5: - Notching of rotor laminations	Vendor			
2.2.6	Station 6: - Punching of finish keyway	Vendor			
2.2.7	Station 7: - Punching of finish shaft hole	Vendor			
2.2.8	Station 8: - Deposit of rotor laminations	Vendor			
2.3	**Technical Data for the line as follows:**	Vendor			
2.3.1	Max. blank diameter stator (Stations 1, 2, 3 + 4)	1300 mm			
2.3.2	Min. blank diameter stator (Stations 1, 2, 3 + 4)	350 mm			
2.3.3	Max. diameter rotor (Stations 5, 6, 7 + 8)	1000 mm			
2.3.4	Min. diameter rotor (Stations 5, 6, 7 + 8)	250 mm			
2.3.5	Max. final shaft hole diameter, shaft hole press	700 mm			
2.3.6	Min. final shaft hole diameter, shaft hole press	120mm			
2.3.7	Stack weight	up to max. 3000kg			
2.3.8	Type of pallets:Four-way flat pallets made of Mild Steel	Vendor			
	Pallet-dimensions:	Vendor to specify.			
	Vendor to Offer the two nos. pallets of each rotor and stator proveout component along with the machine.	Vendor to confirm			
2.3.9	Capacity of notcher	200 kN			
2.3.10	Capacity of shaft hole press	vendor to specify the capacity for cutting up to 700 mm shaft hole diameter w.r.t. clause no. 2.3.5			
2.3.11	Force of retraction of shaft hole press	Vendor to specify			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
2.3.12	Max. lamination thickness	1.0mm			
2.3.13	Throat of notcher	350mm			
2.3.14	Throat of shaft hole press	Vendor to specify			
2.3.15	Opening between walls of shaft hole press	720 mm			
2.3.16	Distance between bed and slide, SDAU of notchers	205mm			
2.3.17	Distance between bed and slide, stroke at BDC of shaft hole press	350mm			
2.3.18	Slide stroke of notcher	16mm			
2.3.19	Slide stroke of shaft hole press max./min.	105/80mm			
2.3.20	Slide adjustment of notcher	25mm			
2.3.21	Working height above bed notchers	70mm			
2.3.22	Working height above bed shaft hole press	170mm			
2.3.23	Max. distance between center of indexing spindle to center of spigot hole in slide	680mm			
2.3.24	Min. distance between center of indexing spindle to center of spigot hole in slide can be reduced by offset tool	135mm			
2.3.25	Min. inner notch circle diameter at 4 mm die wall	220 mm			
2.3.26	Min. number of notches	1			
2.3.27	Max. number of notches	999			
2.3.28	Number of strokes adjustable	180-1000 /min			
2.3.29	Required air pressure	Vendor to specify			
2.3.30	Power consumption	Vendor To specify			
2.3.31	Air consumption	Vendor To specify			
2.4	**Design Features for the machines :**	Vendor			
2.4.1	- Strong, heavy-duty machine frame.	Vendor			
	- Bottom drive.	Vendor			
	- Play-free slide guideways with precision roller gibs.	Vendor			
	- Indexing spindle unit driven by electrical servo motor. The number of notches is programmable.	Vendor			
	- Position of notches to fixing notch is programmable.	Vendor			
	- Drive of eccentric shaft by infinitely variable A.C. motor via belt on flywheel. The stroke rate is calculated automatically on the basis of the set sheet material data.	Vendor			
	- Electro-pneumatically controlled single-plate clutch-and-brake system.	Vendor			
	- Automatic stopping point adjustment.	Vendor			
	- Automatic stopping point correction.	Vendor			
	- Mass balance of the entire slide drive including upper tool.	Vendor			
	- The main drive elements running in anti-friction bearings.	Vendor			
	- Setting of the notching diameter via **electrical servo motor to numerical display or to program data,** read-off accuracy 0.001 mm	Vendor			
	- Automatic clamping of set notching diameter.	Vendor			
	- Tool clamping manually.	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
	- Tool support plate adjustment to bolster plate for easy tool change.	Vendor			
	- Manual slide adjustment.	Vendor			
	- Automatic oil recirculation lubrication system with electric monitoring.	Vendor			
	- Electronical scrap monitoring.	Vendor			
	- General piece counter (number of blanks in total) to be reset to 0.	Vendor			
	- Pre-selection counter for the required number of blanks per order (number of blanks per order). Machine is stopped after reaching the set quantity.	Vendor			
	- Pneumatic equipment with compressed air tank and maintenance and exhaust air muffler.	Vendor			
	- Including the required motors but excluding control cabinet and connecting cable between machine and control cabinet.	Vendor			
	-With firtst fill of lubricant.	Vendor			
2.4.2	**Item - Automatic Stripping Device for Circular Blanks for stripping the notched laminations.**	Vendor			
2.4.3	**Item- Automatic Stripping Device for Circular Blanks (Notching Machine 2) for stripping the notched laminations.**	Vendor			
2.4.4	**Item - Pneumatic Clamping Device for Circular Blanks,with clamping plate.**	Vendor			
2.4.5	**Item - Electronic Double Blank Control adjustable to respective nominal blank thickness**	Vendor			
2.4.6	**Item - Pneumatic Clamping Device for Circular Blanks, (for Notcher 2) with clamping plate.**	Vendor			
2.4.7	**Item- Automatic Feed Unit (Transfer)**	Vendor			
	Linear transfer with electrically controlled grippers for transport of blanks resp. laminations with direct drive by linear motor.	Vendor			
	Gripper in mode setting movable with hand.	Vendor			
	Electro-pneumatically controlled depositing device for the blanks resp. laminations.	Vendor			
	Drives switched off via electronic control of lamination transport and depositing.	Vendor			
2.4.8	**Item- Grippers equipped with Transport Magnets**	Vendor			
	Consisting of:	Vendor			
	-magnet brackets, adjustable to the particular size of blanks and respectively lamination	Vendor			
	-electrical switchable transport magnets for feeding and depositing blanks and resprectively lamination	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
	-electro-pneumatical controlled decollating of rotor blank and stator lamination into two levels at combined notching and separating	Vendor			
	-lamination feeding and depositing electrically controlled	Vendor			
	-adapter plate for centering plate for combined notching and separating dies, die and centering plate to be included in the offer.	Vendor			
2.4.9	**Item - Destacking Station (Station 1)**	Vendor			
	Consisting of:	Vendor			
	-1 conveyor motor driven, designed as loading and unloading station to receive a pallet, operation by push button	Vendor			
	-1 automatically controlled lifting table with conveyor, motor driven	Vendor			
	- 1 automatic centering device for blank stacks	Vendor			
	- 1 device for receiving the upper lamination from blank stack	Vendor			
	Number of blank stacks per pallet	max. 1			
2.4.10	**Item - Automatically stack centering**	Vendor			
	Max. permissible excentricity of blank stack according to the position of blank stacks on pallet	+/- 50 mm			
	Max. permissible stacking in accuracy within one blank stack	+/- 10 mm			
	Min. stack height for automatically stack centering	25 mm			
	Change of pallets by means of fork lift truck	Vendor			
2.4.11	**Item - Centering and Orientating Station (Station 2)**	Vendor			
	Consisting of a centering device for centering of blanks in the centre bore by means fo a tapered centering cone. Orientating blanks according to a keyway or drive pin hole by means of turning the blanks until an orientating pin fits into the keyway or into the drive pin hole of the blank.	Vendor			
	Centering range with adjustable motorized drive.	+/- 20 mm			
2.4.12	**Item - Deposit Station for Stator Laminations**	Vendor			
	Consisting of:-	Vendor			
	- 1 conveyor motor driven, designed as loading and unloading station to receive a pallet, operation by push button	Vendor			
	- 1 automatically controlled lifting table with conveyor, motor driven	Vendor			
	Number of lamination stacks per pallet	max. 1			
	Change of pallets by means of fork lift truck.	Vendor			
	Preselection counter for the required number of laminations in the lamination stack. Machine is stopped when the set number of laminations is reached.	Vendor			
2.4.13	**Item - Deposit Station for Rotor Laminations**	Vendor			
	Consisting of:-	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
	- 1 conveyor motor driven, designed as loading and unloading station to receive a pallet, operation by push button	Vendor			
	- 1 automatically controlled lifting table with conveyor, motor driven	Vendor			
	Number of lamination stacks per pallet	max. 2			
	Change of pallets by means of fork lift truck.	Vendor			
	Preselection counter for the required number of laminations in the lamination stack.	Vendor			
	Machine is stopped when the set number of laminations is reached.	Vendor			
2.4.14	**Item - Shaft Hole Press**	Vendor			
	of welded construction, with hydraulic drive, pillar guiding of slide.	Vendor			
	Hydraulic motor driven slide adjustment.	Vendor			
	Blanking impact damping.	Vendor			
	Automatic slide return in TDC.	Vendor			
	Digital stroke monitoring with electronic cam control unit.	Vendor			
	Machine designed for reception of a pillar-guided standard die set. During tool change, the die set is moved towards press rear side on a bracket.	Vendor			
	Scrap is removed by a chute.	Vendor			
2.4.15	**Item - Device for Lifting of Slide**	Vendor			
	Electro-pneumatically controlled.	Vendor			
2.4.16	**Item - Device for Lifting of Slide (Notching Machine 2)**	Vendor			
	Electro-pneumatically controlled.	Vendor			
2.4.17	**Item - Common Base Plate with vibration-reducing Levelling Elements**	Vendor			
2.4.18	**Item - Safety Guard for safeguard system.**	Vendor			
	The doors integrated in the safety guards are protected with limit switches.	Vendor			
2.4.19	**Item - Electronic Notch master Control including Process Visualization** on Screen	Vendor			
	Process Visualization must be by means of Industrial PC including colour screen: • One language switchable • Input of order and set-up data in plain text • Display of set and actual values • Operation messages in plain text • Operator guidance in plain text • Display of faults in plain text • Save menu to save the lamination data and operation data	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
3	**Electrical Control Units**	Vendor			
3.1.0	**Free-standing control cabinet, containing:**	Vendor			
	- power supply and energy distribution	Vendor			
	- CNC control	Vendor			
	- Safety control	Vendor			
3.1.2	Power Supply: 415 V: - 10%, +10%, 50 Hz: ± 3% , 3 phase AC(3 wire supply without neutral). Source will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be in the scope of the Vendor. Requirement of grounding/earthing with required material details is to be informed by Vendor well in advance so that same could be incorporated during construction of foundation.	Vendor			
3.1.3	All electrical / electronic equipment shall be tropicalized	Vendor			
3.1.4	All electrical & electronic control cabinets & panels should be dust and vermin proof	Vendor			
3.1.5	Motors shall conform to IEC or Indian Standards	Vendor			
3.1.6	Oil-proof cables shall be used for power and control supply. Connection lines between control cabinet and machine shall be of plug-in type. Main drive cables shall be routed via terminal boards.	Vendor			
3.1.7	All cables moving with traversing axes should be installed in Caterpillar/ Drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer.	Vendor			
3.1.8	Vendor should ensure double earthing for the machine and its peripherals.	Vendor			
3.1.9	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents. i.e. they shall be replaceable by their equivalents available in Indian market	Vendor			
3.1.10	All electrical components in the cabinets shoul be mounted on DIN Rail.	Vendor			
3.2	**AIR CONDITIONERS:**	Vendor			
3.2.1	Air Conditioners with Dehumidifiers of suitable / sufficient capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. Detailed specifications of the same are to be submitted.	Vendor			
3.3	**OPERATOR'S PANEL:**	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
3.3.1	Swiveling and sliding type main control panel based on Industrial PC having complete CNC and machine control system with TFT/CRT of required configuration shall be provided on the operators platform for safe, convenient and efficient operation All control units , switches should be within reach of operator of average height (Indian) for easy operation. All displays/indications should also be conveniently placed accordingly. Connecting cables from Control Cabinets shall be provided. Plug in arrangement of connections in the control cabinet shall be provided. Layout showing complete details should be submitted.	Vendor			
3.4	**CNC SYSTEM & FEATURES :**	Vendor			
3.4.1	Make : Fanuc or Siemens.	Vendor			
3.4.2	Type : Microprocessor based latest version	Vendor			
3.4.3	Model: (Latest version, as available at the time of ordering, should be supplied)	Vendor			
3.4.4	Details of Standard features	Vendor to submit			
3.4.5	Details of optional features, recommended by Vendor.	Vendor to submit			
3.4.6	The system should have full alphanumeric keyboard, TFT color display(10.4" or more), additional draw-out type Querty Key Board and mouse in suitable enclosure, RS232C serial interfaces, parallel interface for printer, COM port for tele-diagnostics, network ready with LAN, electronic hand wheels for all axes, 3.5" floppy drive unit for data input/output, hard disk of sufficient capacity, graphic simulation and preinstalled system software & other required softwares etc. (Details should be submitted by Vendor)	Vendor			
3.4.7	An open-type control system with a standard industrial PC and colour monitor for the visualization and control of the production process shall be provided.	Vendor			
3.4.8	Secondary programmable logic controller with distributed peripherals connected with a standard field bus system for machine control shall be provided.	Vendor			
3.4.9	The input shall be by means of soft keys as well as by an alphanumeric keyboard. During the different operating modes such as set-up, automatic continuous run or tool change, the operator shall be guided step-by-step by graphical representation or actual pictures	Vendor			
3.4.10	For process visualisation, dynamic representation by bars, symbols, digital values and alphanumeric text shall be used.	Vendor			
3.4.11	The control system shall be designed such that there is no manual access to danger points. The guards shall be locked and prevent reaching in. Positions of the safety guards shall be monitored by press control.	Vendor			
3.4.12	A module for the extensive tool data organization, in which it shall be possible to enter, edit and store all parameters required for tool-independent setting of machine shall also be provided.	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
3.4.13	The maintenance messages generated by the machine control system shall inform the operator by flashing of a maintenance symbol that maintenance work is due to be carried out. Provision for bypassing the message by authorized personnel shall also be provided	Vendor			
3.5	**MANUAL CONTROL :**	Vendor			
3.5.1	Complete manual control of machine with required switches / keys should be provided on operator's panel.	Vendor			
3.6	**UPS FOR CNC SYSTEM:**	Vendor			
3.6.1	UPS of 30 minutes for CNC system with inbuilt cooling and charge status display shall be supplied. (Battery charging /discharging time should be specified by Vendor)	Vendor			
4	**Item - Electrical Equipment, Electrical Supply**	Vendor			
4.0	**- Ambient Conditions**	Vendor			
	Design of electrical equipment in accordance with DIN EN 60204 part 1 (VDE 0113 part 1).	Vendor			
4.1	**-Electrical supply**:				
	Temperature:	ranging from +5°C to +50°C			
	Relative air humidity:	Maximum 95%			
	Altitude:	600 Meter above sea level			
4.2	**Item - Special Voltage**				
	Main circuit – Voltage Tolerance	3 Phase, 415 ± 10 %V AC			
	Control circuits	220 V AC			
		24 V DC			
	Network configuration	TN-S			
	Frequency	50 Hz ± 3%			
4.3	Weather conditions are tropical, Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition. Max. temperature variation is up to 25 deg Celsius in 24 hours.	Vendor			
4.4	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the machine should be ensured by Vendor.	Vendor			
4.5	The machine, including attachments and accessories, should be suitable for 24 hrs. continuous operation throughout the year.	Vendor			
5	**DIAGNOSTIC SYSTEM**				
5.1	**TELE-DIAGNOSTIC SERVICE :**	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
5.1.1	Tele-diagnostic service should be provided through International telephone lines along with required Hardware / Software package for the supplied CNC system for remote diagnosis and correction of the problems in both CNC System and PLC of the machine. This should be provided free of charge for the guarantee period.	Vendor			
5.2	**FAULT DIAGNOSTIC SYSTEM:**	Vendor			
5.2.1	Vendor's own diagnostic system with required hardware and software should be supplied and installed on the CNC system. This should include customized auto-diagnostic system with supporting hardware and software which shows detailed cause and remedy for the fault on the display with diagnostic help for faults related to mechanical and electrical maintenance	Vendor			
5.2.2	Help guide should be provided to use both diagnostic systems	Vendor			
5.3	**Item - Text on Plates and on Display Screen (in English language)**	Vendor			
6	**TECHNICAL DOCUMENTATION (In English Language)**				
6.1	The scope of supply comprises:	Vendor			
6.1.1	3 Sets of Operation & Maintenance Manuals (in English language) consisting of: -Technical Specification, Transportation and Installation - Safety Instructions - Start-Up Instructions - Operating Instructions - Instructions for Maintenance and Inspection - List of Wear and Spare Parts (in English) in English - Proposal Drawings for Cutting Tools (in English) -Operating manuals of Machine & CNC system -Programming Manuals of Machine & CNC system -Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Coolant / Hydraulic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list also. -Maintenance, Interface & commissioning manuals for CNC system -Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable. -PLC program print-outs with comments in English. -PLC program on CD/DVD, NC data & PLC data on CD/DVD. -Complete back-up of hard disk on CD/DVD and clear written Instructions (2 copies) to take back-up and reloading of a new hard disk. -Complete Master List of parts used in the machine along with part numbers and ordering numbers.	Vendor			
6.1.2	3 Sets of Electrical Documentations (in English language) consisting of:	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
	- List of Electrical Units -Descriptive leaflets, technical literature, drawings, schematic diagrams, electrical wiring diagram, spare parts manuals, Installation and commissioning drawing etc shall be supplied. -Layout drawing, major assembly drawings, schematic diagrams, control philosophy etc shall be subject to approval of BHEL. Approval of drawings/ documents by BHEL will not relieve the Vendor of his responsibility of meeting the requirements of the specification. -The technical documentation shall include documentation of outsourced items also.				
6.1.3	All Specifications and Design Documents shall be neatly printed on A4 size paper. All drawings shall be of standard sizes (A0 ,A1, A2 etc). The title block shall be as approved by BHEL.	Vendor			
6.1.4	Upon completion of construction, the design drawings shall be revised to reflect accurately the facilities as built. The drawings shall be issued under the appropriate revision and marked “AS BUILT”.	Vendor			
6.1.5	The number of copies of design documents and drawings required to be submitted should be as follows: -	Vendor			
	For approval :	3			
	Design Calculations / reports / documents	3			
	Drawings / documents required for Construction/ Procurement	3			
	After completion of work:				
	Drawings (“As Built”)	3			
	Drawings in Soft copies in CD	2			
6.1.6	One Set of above documentations in English language to be placed in the control cabinet.	Vendor			
6.1.7	One copy of Machine Specific Software - Run Time Version (without comment) shall be supplied by vendor	Vendor			
7	**SPECIAL ACCESSORIES**				
7.1	**Item - Programmable Lateral Adjustment Device for the Bed Plate (Notching 2, Rotor Notching)**	Vendor			
7.1.1	- For punching of parallel skewed notches into lamination packs.	Vendor			
	- Movement of displacing made via ball screw spindle and electric servo motor. Resetting by electric motor.	Vendor			
	- Including CNC control and software program.	Vendor			
	- Input data: - total pack height - total skewing (any direction) - leading skewing - theoretical lamination thickness - part pack 1: - total end lamination thickness front	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
	- part pack height - total end lamination thickness rear - ventilation duct width - input of max. 30 different part packs possible.				
	- With these inputs it is assured at parallel skewing that the skewing of the notches in the lamination pack will run continuos and that the part pack heights are defined automatically regardless of lamination thickness and width of ventilation ducts.	Vendor			
	- Re-punching of any lamination should be possible.	Vendor			
	- End laminations of different lamination thickness can be manufactured in a separate operation.	Vendor			
7.2	**Item - Programmable Lateral Adjustment Device for the Bed Plate (Notching 1, Stator Notching)**	Vendor			
7.2.1	- For punching of parallel skewed notches into lamination packs.	Vendor			
	- Movement of displacing made via ball screw spindle and electric servo motor. Resetting by electric motor.	Vendor			
	- Including CNC control and software program.	Vendor			
	- Input data: - total pack height - total skewing (any direction) - leading skewing - theoretical lamination thickness - part pack 1: - total end lamination thickness front - part pack height - total end lamination thickness rear - ventilation duct width - input of max. 30 different part packs possible.	Vendor			
	- With these inputs it is assured at parallel skewing that the skewing of the notches in the lamination pack will run continuos and that the part pack heights are defined automatically regardless of lamination thickness and width of ventilation ducts.	Vendor			
	- Re-punching of any lamination should be possible.	Vendor			
	- End laminations of different lamination thickness can be manufactured in a separate operation.	Vendor			
7.3	**Item- Lubrication Unit (Notching 2)**	Vendor			
	for automatic spraying of lubricant onto the blank. The quantity of lubricant per blank is programmable.	Vendor			
7.4	**Item - Scrap Conveyor (Notching 1)**	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
	designed as permanent magnetic chute conveyor with fixed chute made of wear resistant CrNi steel and moving permanent magnets, mounted ready for wiring, including drive motor.				
7.5	**Item- Scrap Conveyor (Notching 2)**	Vendor			
	designed as permanent magnetic chute conveyor with fixed chute made of wear resistant CrNi steel and moving permanent magnets, mounted ready for wiring, including drive motor.	Vendor			
7.6	**Item - Scrap Conveyor (Shaft Hole Press)**	Vendor			
	designed as permanent magnetic chute conveyor with fixed chute made of wear resistant CrNi steel and moving permanent magnets, mounted ready for wiring, including drive motor				
7.7	**Item - Electro pneumatic Control for Blowing Scrap Out of the Die (Notcher 2)**	Vendor			
7.8	**Item - Automatic Pallet Exchange in the Destacking Station (Station 1)**	Vendor			
	Additional motorized conveyor at the rear side of the manufacturing line for removal of one pallet.	Vendor			
	The pallet exchange can be executed alternatively: - by means of push button, or - automatically if indication “pallet empty” appears.	Vendor			
7.9	**Item - Automatic Pallet Exchange in the Stator Stacking Station (Station 4)**	Vendor			
	Additional motorized conveyor at the rear side of the manufacturing line for input of one pallet.	Vendor			
	The pallet exchange can be executed alternatively: - by means of push button, or - automatically after achieving the programmed number of lamination which is pre-selected in the pre-selection counter, or - if indication „pallet full“ appears.	Vendor			
7.10	**Item - Automatic Pallet Exchange in the Rotor Stacking Station (Station 8)**	Vendor			
	Additional motorized conveyor at the rear side of the manufacturing line for input of one pallet.	Vendor			
	The pallet exchange can be executed alternatively:	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
	- by means of push button, or - automatically after achieving the programmed number of laminations which is pre-selected in the pre-selection counter, or - if indication "pallet full" appears.				
7.11	**Item - Device for Turning of Adjacent Laminations by 180°, 120° or 90° eachfor equalization of material thickness, according to respectively arranged keyways or drive pin holes by control of orientating pin to the respective torsion angle.**	Vendor			
7.12	**Item - Punching Unit for Stator Marking for Punching of one Notch at Stator Outer Diameter**	Vendor			
	Distance between center of blank and center of stator marking	min. 300mm			
	Nominal capacity	20 kN			
7.13	**Item - Punching Unit for Punching of a finished Keyway in the Rotor Lamination** with slide adjustment	Vendor			
	Distance between center of blank and center of keyway	min. 60mm			
	Finished shaft hole diameter	min. 120mm			
	Distance between center of blank and center of keyway	max. 270 mm			
	Nominal capacity However, without cutting elements.	30 kN			
7.14	**Item - Sound Enclosure 20 dB(A) must be provided**	Vendor			
	Noise reduction: approx. 20 dB(A)	Vendor			
	The following measuring method for testing of the noise reduction will be applicable:	Vendor			
	- Measurement of noise level with doors opened, at a distance of 30 cm from center of tool at the operator´s side of the notching machine.	Vendor			
	- Second to seventh measurement with doors closed, at a distance of 1 m each from enclosure, height 1.5 m above floor, in extension of each one of the stations of the transport transfer.	Vendor			
	- The difference between the first and the average value of second and seventh measurement will be no less than 20 dB(A), i. e. with a punching noise level of 105 dB(A) at first measurement, an overall average noise level of 85 dB(A) must be obtained.	Vendor			
8	**ADDITIONAL SOFTWARE PROGRAMS**	Vendor			
8.1	Program control by the CNC control of the machine, data input via keyboard.	Vendor			
8.2	**Item - For Intermittent Notching (Notcher 2)**	Vendor			
	for punching a sequence of notches with interrupted punching must be provided.	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
	2 pre-selections with 2 decades each	Vendor			
	Input data: number of punchings of notch group 1 number of indexings in non-punching area 1 number of punchings of notch group 2 number of indexings in non-punching area 2	Vendor			
8.3	**Item -Dynamic reduction of stroke rate**	Vendor			
	Pre-selectable. During notching and separating the stroke rate could be reduced at the end of the cycle to run the last indexing step with reduced acceleration.	Vendor			
8.4	**Item - For Spiral Skewing (Notcher 2, Rotor Notching)**	Vendor			
	Input data: - total pack height - total skewing (any direction) - leading skewing - theoretical lamination thickness - part pack 1: - total end lamination thickness front - part pack height - total end lamination thickness rear - ventilation duct width - input of max. 30 different part packs must be possible.	Vendor			
	With these inputs it is assured at spiral skewing that the skewing of the notches in the lamination pack must run continuous and that the part pack heights should be defined automatically regardless of lamination thickness and width of ventilation ducts.	Vendor			
	Re punching of any lamination should be possible.	Vendor			
	End laminations of different lamination thickness could be manufactured in a separate operation.	Vendor			
8.5	**Item - For Spiral Skewing (Notcher 1, Stator Notching)**	Vendor			
	Input data: - total pack height - total skewing (any direction) - leading skewing - theoretical lamination thickness - part pack 1: - total end lamination thickness front - part pack height - total end lamination thickness rear - ventilation duct width	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
	- input of max. 30 different part packs must be possible.				
	With these inputs it is assured at spiral skewing that the skewing of the notches in the lamination pack must run continuous and that the part pack heights should be defined automatically regardless of lamination thickness and width of ventilation ducts.	Vendor			
	Re punching of any lamination should be possible.	Vendor			
	End laminations of different lamination thickness could be manufactured in a separate operation.	Vendor			
9	**SPARES:**	Vendor			
9.1	Itemised break-up of mechanical, hydraulic, electrical and electronic spares in sufficient quantity as per recommendation of Vendor for 2 years of operation on three shifts continuous running basis should be offered by Vendor.	Vendor			
9.2	In addition to other recommended spares, the list shall include the following: Mechanical & Hydraulic Spares: All types of pumps, Valves, pressure switches / transducers, filters, seals etc.	Vendor			
9.3	Electrical /Electronic / CNC Spares: All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, Scanning Heads for Linear Scales, MMC module, NCU module, Operator's panel with Display Unit, I/O Cards for PLC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc.	Vendor			
9.4	All types of spares for total machine and accessories should be available for atleast ten years after supply of the machine. If machine or control is likely to become obsolete in this period, the Vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & Vendors to enable BHEL to procure these in advance, if required.	Vendor			
9.5	Complete list of spares for machine and accessories, along with specification / type / model, and name & address of the Vendor shall be furnished along with documentation to be supplied with the machine.	Vendor			
10	**COMPONENT RELATED ACCESSORIES :** Vendor to offer following acessories:	Vendor			
10.1	**Item - Support Centering Plate (Notcher I)** with clamping plate, suited for pneumatic blank clamping, for shaft hole diameters:	above 60 to 100 mm			
10.2	**Item -Support Centering Plate (Notcher 2)** with clamping plate, suited for pneumatic blank clamping, for shaft hole diameter	100-200 mm			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
10.3	**Item - Support Centering Plate (Keyway Puncher)** with clamping plate, suited for pneumatic blank clamping, for shaft hole diameter.	above 60 to 100 mm			
10.4	**Item -Orientating Plate for Orientating for Shaft Hole Diameter**	above 60 to 100 mm			
11	**TOOLING:** Vendor to offer following Toolings:				
11.1	**Item - Centering plate for outer centering,** Adjustable for rollers for stator outer diameter	600 – 1260 mm			
11.2	**Item - Standard Die Shoe, Model E (Throat 190 mm) Notcher 1** welded steel structure, with 2 guiding pillars running in ball bushes, weight of upper part optimized.	Vendor			
	Cutting elements exchangeable.	Vendor			
	Upper and lower tool have positioning holes and threaded holes for fixing punch and die.	Vendor			
11.3	**Item - Standard Die Shoe, Model E (Throat 190 mm) Notcher 2** welded steel structure, with 2 guiding pillars running in ball bushes, weight of upper part optimized.	Vendor			
	Cutting elements exchangeable.	Vendor			
	Upper and lower tool have positioning holes and threaded holes for fixing punch and die.	Vendor			
11.4	**Item - Set of Cutting Elements E for Single Notch (High Speed Tool Steel)** suited for Standard Die Shoe, Model E,consisting of die, punch, hardened stripper plate and compression springs for stripper plate, cutting elements made of heavy duty tool steel, punch and die super finish wire-eroded	Vendor			
	for punching of rotor notches in laminations acc. to drawing Number No.	**24038140133**			
	Number:	1			
11.5	**Item - Combined Set of Cutting Elements E for Single Notch and Air Gap (HWS)** suited for Standard Die Shoe, Model E	Vendor			
	consisting of die, punch, hardened stripper plate and compression springs for stripper plate, cutting elements made of heavy-duty tool steel, punch and die superfinish wire-eroded.	Vendor			
	for simultaneous punching of stator laminations acc. to drawing No. and of air gap between stator and rotor	**24036240047**			
	Number:	1			
11.6	**Item - Master-Aligning Shoe E** with 4 pillar guidings running in ball bushes, for aligning and pouring of sets of cutting elements within standard die shoe model E.	Vendor			
11.7	**Item - Master-Aligning Shoe** with 4 pillar guidings running in ball bushes, for aligning and pouring of sets of cutting elements within standard die shoe for shaft hole presses. Can be used at new and previously delivered standard die shoes for shaft hole press.	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
11.8	**Item - Standard Die Shoe for Shaft Hole Press** with pillar guiding running in ball bushes, suited for use in shaft hole press , however, without cutting elements.	Vendor			
	Provided for installation of cutting tool sets for punching of one finished shaft hole up to a diameter of max. 700 mm. Fixing of die shoe in the press by screws in upper and lower tool, positioning by pins in lower tool.				
11.9	**Item - Set of Cutting Elements with controlled Ejector for Shaft Hole (HWS)**suited for standard die shoe for shaft hole press, consisting of die, punch and hardened stripper plate, compression springs for stripper plate and controlled ejector, cutting elements made of heavy-duty tool steel, punch and die wire-eroded.	Vendor			
	for punching of a finished shaft hole dia. in laminations acc. to drawing No.	**24038140133**			
	Number:	1			
11.10	**Item - Set of Cutting Elements for Stator Marking (HWS)**suited for the punching unit for stator marking, consisting of die, punch and spring-loaded plastic stripper, cutting parts of heavy-duty tool steel, punch and die wire-eroded,for punching one marking notch at stator outer diameter dimension of stator marking:	**24036240047**			
11.11	**Item-Set of Cutting Elements for Keyway (HWS)**suited for the punching unit for keyway, consisting of die, punch and spring-loaded plastic stripper unit, cutting parts made of heavy-duty tool steel, punch and die wire-eroded,for punching one keyway in shaft hole range dimension of keyway:	**24038140133**			
11.12	**Item - Additional Guide Rail at Upper Tool for Parallel Skewing** for the cutting tools, for the standard die sets and for punching parallel skewed notches.	Vendor			
	For each cutting tool or each cutting die for parallel skewing one guide rail is required.	Vendor			
12	**DIE/TOOLING DESIGN DATA:**	Vendor			
12.1	Complete tool design information along with presses mounting details shall be supplied for the manufacture of the dies to suit the presses and its control system.	Vendor			
12.2	The Vendor to include the price for supply of Dies/Toolings in his offer as per clause no. 11.	Vendor			
13	**MACHINE LIGHTS:**	Vendor			
13.1	Machine Lights for sufficient illumination of the working area should be provided for clear visibility	Vendor			
13.2	A magnetic base portable spot light with sufficiently long cable should also be provided.	Vendor			
13.3	Any lights required in the foundation/ pit area shall also be foreseen and supplied by the Vendor.	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
13.4	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents. i.e. they shall be replaceable by their equivalents available in Indian market	Vendor			
14	**HYDRAULIC SYSTEM : Details should be Submitted by the Vendor**	Vendor			
14.1	The System should be centralised. Hydraulic Tank shall preferably be located at floor level	Vendor			
14.2	Make Rexroth / Vickers Sperry or equivalent from a reputed manufacturer. (Details to be submitted)	Vendor			
14.3	Filtration System, Details should be submitted.	Vendor			
14.4	Failure indication	Vendor			
14.5	Automatic shut off provision, Details should be submitted.	Vendor			
14.6	Refrigerated type cooling and electric heating (Electric heating only if required) system of sufficient capacity to maintain complete Hydraulic System, including lubrication oil, hydrostatic oil and gearbox oil, etc. at a temperature not exceeding 40 deg C irrespective of the ambient conditions. Complete details should be submitted	Vendor			
14.7	Hydraulic pump capacity (flow / pressure)	Vendor			
14.8	Each pump should have an independent motor. Tandem pumps should not be used	Vendor			
15	**SAFETY ARRANGEMENTS:**	Vendor			
15.1	Following safety features in addition to other standard safety features should be provided on the machine:	Vendor			
15.2	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, work piece and the operator due to the malfunctioning or mistakes. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on CNC display and panels) should be available.	Vendor			
15.3	A detailed list of all alarms / indications provided on machine should be submitted by the Vendor.	Vendor			
15.4	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement for effective use of machine.	Vendor			
15.5	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Vendor			
15.6	Emergency Switches at suitable locations as per International Norms should be provided.	Vendor			
15.7	Oil & water pipe lines should not run with electrical cable in the same tray / trench.	Vendor			
15.8	Safety fence shall be installed at suitable locations as necessary for the safety of the operator and others working nearby.	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
16	**ENVIRONMENTAL PERFORMANCE OF THE MACHINE :**	Vendor			
16.1	The Machine should conform to following factors related to environment :	Vendor			
16.2	The noise level during operation of the machine shall be as low as possible. Maximum noise level under normal load condition, 1 M away from the machine with correction factor for back ground noise shall be indicated. This will be measured as per international standards like DIN 45635-16. Vendor to demonstrate compliance to noise level, if so required	Vendor			
16.3	There shall not be any harmful emissions from the machine, the machine shall not produce any harmful effluents and no hazardous chemicals shall be used in the machine. The composition of the exhaust gases shall be informed by the vendor.	Vendor			
16.4	If any safety / environmental protection enclosure is required it should be built in the machine by the Vendor and details shall be given in the offer	Vendor			
16.5	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor			
17	**FIRST FILL OF OILS AND GREASES**	Vendor			
17.1	First filling of all required lubricating oils & grease etc. shall be supplied by Vendor. Indian source or Indian equivalent and specifications of oils/ greases are also to be provided by the Vendor.	Vendor			
		Vendor			
18	**NETWORKING:**	Vendor			
18.1	Machine control should have necessary hardware and software for interfacing with Local Area Network. The networking should have following capabilities.	Vendor			
18.2	The machine shall appear as a node in the Entire Network. (Network Neighbourhood)	Vendor			
18.3	The program transfer shall be by simple copy and paste method provided sharing access is allowed between any PC and the machine across the network.	Vendor			
18.4	The program transfer between CNC system and network should also be possible in CNC Mode.	Vendor			
19	**SCRAP DISPOSAL**	Vendor			
19.1	Scrap generated by air holes, slots and other small cuts shall be discharged out of the machine through proper arrangements like scrap conveyor, chutes etc. the scrap conveyor, chutes etc. used for scrap disposal shall be provided by the vendor. this scrap shall fall on the scrap disposal conveyor belt. The layout of conveyor belt shall be provided by BHEL as per the design provided by the Supplier.	Vendor			
20	**SERVO VOLTAGE STABILIZER:**	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
20.1	Indian make Oil / Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, its drives, controls, PLC etc with no undesirable Harmonics in the stabiliser output shall be supplied.	Vendor			
	Model & Rating	Vendor			
	Spares for the Voltage Stabiliser for 2 years working should also be offered.	Vendor			
	Catalogue of the Voltage Stabiliser shall be submitted with the offer.	Vendor			
21	**ULTRA ISOLATION TRANSFORMER**	Vendor			
21.1	Indian make Ultra Isolation Transformer suitable for complete machine , its drives, controls, PLC etc. shall be supplied	Vendor			
	Model and Rating	Vendor			
	Spares for the Ultra Isolation Transformer for 2 years working should also be offered.	Vendor			
	Catalogue of the Ultra Isolation Transformer shall be submitted with the offer.	Vendor			
22	**AIR COMPRESSOR:**	Vendor			
22.1	Air compressor, air dryer, air reciever, connecting hoses/pipes, valves, pressure switches etc. of suitable type and capacity to be supplied along with the machine. The air delivery of compressor shall meet all the air requirement of machine. Vendor to ensure the quality of air supplied by compressor shall be suitable to machine under operation. all pressure valves, pressure guages,pressure switches, hose pipes, pneumatic controls etc. required for smooth and trouble free running of compressor shall be provided by the vendor. vendor to include spares for two years of trouble free working of air compressor in his offer.	Vendor			
	Make & Model of Air Compressor	Vendor			
	Make & Model of Refrigerated Air Dryer	Vendor			
	Capacity (Flow, Pressure & KW)	Vendor			
		Vendor			
23	**LEVELING & ANCHORING SYSTEM:**	Vendor			
23.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc should be supplied along with machine	Vendor			
24	**TOOLS FOR INSTALLATION, OPERATION & MAINTENANCE :**	Vendor			
24.1	Special tools and equipment required for Installation of the machine shall be brought by the vendor. Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc.for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer.	Vendor			
25	**TRAINING:**	Vendor			
25.1	**TRAINING AT BHEL PLANT**	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
25.1.1	The Vendor shall undertake training of Mechanical, Electronics & Control persons in operation and maintenance of the machine at BHEL's works for a period of 2 weeks. The training program shall be as follows:	Vendor			
25.1.1.1	Construction and functioning of the system	Vendor			
25.1.1.2	Presentation of individual components by means of sectional views and schematic drawings	Vendor			
25.1.1.3	Safety instructions	Vendor			
25.1.1.4	Setting up of system	Vendor			
25.1.1.5	Demonstration of machine in operation	Vendor			
25.1.1.6	Resetting of system	Vendor			
25.1.1.7	Operator control of system in all operating modes	Vendor			
25.1.1.8	Programming of all required data	Vendor			
25.1.1.9	Going through all operating instructions	Vendor			
25.1.1.10	Display and control system	Vendor			
25.1.1.11	Fault location by means of programming unit	Vendor			
25.1.1.12	CNC Part Programming/ Technology, Use of all CNC Features.	Vendor			
25.1.1.13	Electrical, Electronic & CNC maintenance for machine & other supplied equipments	Vendor			
25.1.1.14	Mechanical & Hydraulic maintenance of the machine & other supplied equipments	Vendor			
25.1.1.15	Other operational requirements	Vendor			
25.1.2	**TRAINING AT VENDOR'S WORKS:**	Vendor			
25.1.2.1	The Vendor shall undertake training of 3 persons in operation and maintenance of the machine at Vendor's works for a period of 2 weeks. The training program shall include construction and operational features of the machine, it's operational requirements, programming and fault analysis etc.	Vendor			
25.1.2.2	The training shall include: - CNC Part Programming/ Technology, Use of all CNC Features, Programming for Measuring Systems & supplied accessories etc. - Electrical, Electronic & CNC maintenance for machine & other supplied equipments - Mechanical & Hydraulic maintenance of the machine & other supplied equipments - Operation of the machine & other supplied equipments.	Vendor			
25.1.2.3	Air-fare, boarding & lodging for the trainees shall be borne by BHEL. All training expenses shall be born by the Vendor. Vendor to quote for training on per man per week basis	Vendor			
25.1.2.4	Competent, English speaking experts shall be arranged by the Vendor during training for satisfactory & effective training of BHEL personnel.	Vendor			
25.1.2.5	Vendor shall be ready to organize and quote for training of Electronics Engineer and Programmer at the CNC System Manufacturer's works for advanced features and specialised training if so required by BHEL	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
26	**FOUNDATION :**	Vendor			
26.1	Vendor shall submit the preliminary layout drawing for BHEL's approval. Soil condition data will be furnished by BHEL along with the approval. After approval of layout drawing, complete Foundation Design including details, like Static/ Dynamic load details etc. and final Layout Drawings shall be submitted by the Vendor. BHEL shall construct complete foundation for the machine as per instructions of the Vendor and at Vendor's responsibility. Vendor may supervise the construction of foundation if he so desires.	Vendor			
26.2	The Vendor shall also indicate detailed specifications of grouting compound and grouting procedure etc. for foundation bolts of the machine.	Vendor			
27	**INSTALLATION & COMMISSIONING:**	Vendor			
27.1	Vendor shall be fully responsibility for carrying out the Installation, start up, testing and commissioning of machine, it's control system & all other supplies etc. Service requirement like power & water shall be provided by BHEL at only one point to be indicated by Vendor in their foundation/layout drawings. 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			
27.2	Successful completion of performance tests shall also be part of commissioning tests.	Vendor			
27.3	Tools, Tackles, instruments and other necessary equipment including Laser equipment required to carry out Installation and commissioning activities should be arranged by the Vendor.	Vendor			
27.4	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought/ arranged by the Vendor.	Vendor			
27.5	if any paint on the machine has rubbed off or peeled during transit or Installation the area 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			
27.6	Schedule of Installation and Commissioning shall be submitted with the offer.	Vendor			
27.7	Charges, duration, terms & conditions for Installation & Commissioning should be furnished in detail by Vendor along with offer.	Vendor			
27.8	Successful proving of BHEL components by the vendor shall be considered as part of commissioning.	Vendor			
28	**ASSEMBLY AND TESTING AT VENDOR'S WORKS**	Vendor			
28.1	The machine shall be completely installed and tested at Vendor's works. BHEL Engineers may witness the test of the machine at Vendor's works.	Vendor			
28.2	Tests shall be performed to prove the machine parameters of the specifications. The testing component profile shall be as per drg. No. 24038140133 and drg. No. 24036240047	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
28.3	The Machine shall be dispatched only after acceptance of tests and clearance for dispatch in writing by BHEL	Vendor			
28.4	Material required for testing at vendor's works shall be arranged by Vendor. Vendor to include this in his offer.	Vendor			
28.5	Components produced during testing at vendor's works shall be dispatched along with machine	Vendor			
29	**ACCURACY TESTS:**	Vendor			
29.1	**GEOMETRICAL ACCURACIES :**	Vendor			
29.1.1	Geometrical Accuracy Tests shall be in accordance with JIS B 6402, Grade-I or equivalent international standard. Detailed Test Charts for the same, clearly showing the accuracies to be achieved on the machine, shall also be submitted with the offer.	Vendor			
29.1.2	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at Vendors works and during Installation & Commissioning at BHEL Works.	Vendor			
29.2	**MACHINE POSITIONING ACCURACIES & REPEATABILITY:**	Vendor			
29.2.1	Positioning accuracy in X axis	Vendor			
29.2.2	Positioning accuracy in Y axis	Vendor			
29.2.3	Positioning accuracy in Z axis	Vendor			
29.2.4	Standard for measuring of positioning accuracy should be submitted.	Vendor			
29.2.5	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at Vendors works and during Installation & Commissioning at BHEL Works	Vendor			
30	**PROVEOUT OF BHEL COMPONENTS :**	Vendor			

Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
30.1	Drawings showing various components likely to be manufactured on the machine is attached. Proveout to be done on these components and also on other components as specified by BHEL.Vendor to submit preliminary process, time study & tool list recommended by them along with the offer. Change in process/tools may be mutually discussed and agreed. Complete process of proveout components shall be done by the vendor at BHEL works to the specified design accuracy, using cutting tools and CNC programs (to be provided by the vendor to prove the machine after complete installation & test.) Material for the proveout components at BHEL works shall be provided by BHEL. Vendor should submit the CNC programs, setting schemes, process sheets, tooling layouts, time studies etc. in advance for the proveout components.Vendor shall be fully responsible for proveout of the components as per drawing,speed of operation for various component and other requirements specified by BHEL to the full satisfaction of 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 discussions.	Vendor			
30.2	Vendor shall be responsible for any deviation/rejection in proveout component due to malfunctioning of the machine during proveout and also for the delay due to improper recommended tooling etc.	Vendor			
31	**MACHINE ACCEPTANCE: (Tests/Activities to be Performed by Vendor)**	Vendor			
31.1	**Tests/Activities to be carried out at Vendor's works on the machine before dispatch :**	Vendor			
31.1.1	Geometrical & Positioning accuracies as per test chart.	Vendor			
31.1.2	Demonstration of all features of the machine, control system & accessories	Vendor			
31.2	**Tests/Activities to be carried out at BHEL works while commissioning the machine :**	Vendor			
31.2.1	Geometrical & Positioning accuracies as per test chart.(if required)	Vendor			
31.2.2	Full load test to demonstrate the maximum power & cutting capacity and production output rate of the machine.	Vendor			
31.2.3	The machine should be tested for continuous working of 48 hrs (including planned stoppages). If any break down occurs during this test, the test should be repeated for 48 hrs from that time.	Vendor			
31.2.4	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine	Vendor			
31.2.5	Two weeks supervision of independent operation of machine by BHEL after job proveout	Vendor			

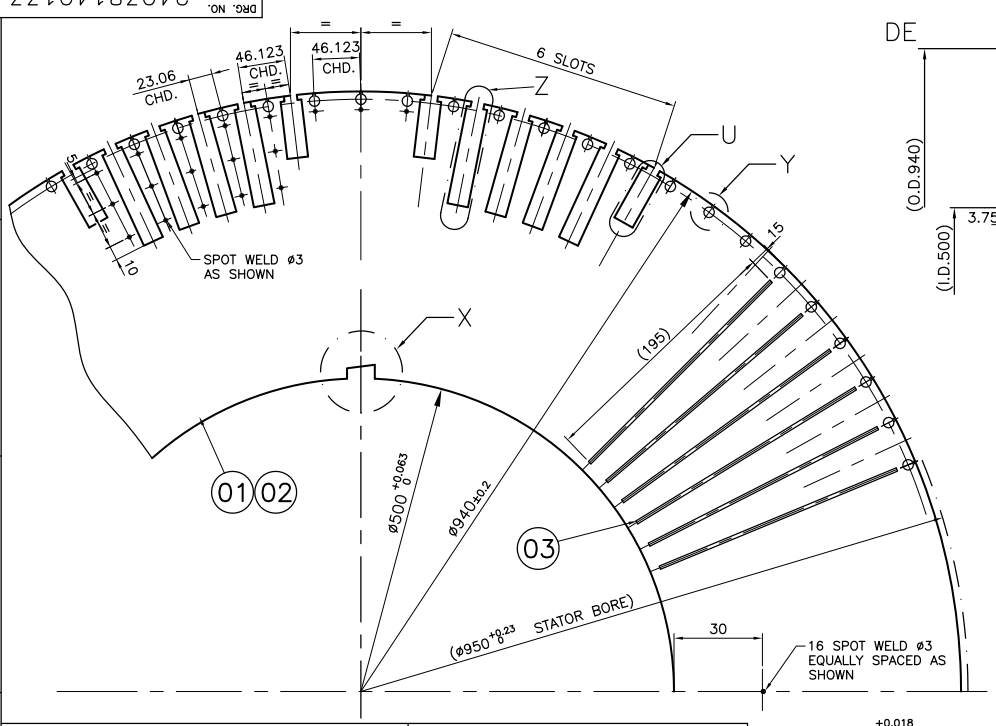
Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
31.2.6	Training of BHEL machine operators in operation of complete machine & accessories etc by the Vendor's experts / engineers during their stay at BHEL works	Vendor			
32	**PERFORMANCE TESTS AT BHEL WORKS**	Vendor			
32.1	The performance of the machine shall be checked under various operating conditions such as:	Vendor			
32.2	Production of various laminations as specified by BHEL	Vendor			
32.3	Check for dimensional accuracy of the stampings produced.	Vendor			
32.4	Check for Line capacity and speed of operation	Vendor			
32.5	Check for satisfactory operation of various systems under manual and auto mode.	Vendor			
32.6	Check for operation and interlocking of control system and its visualisation by operator induced faults.	Vendor			
33	**PERFORMANCE GUARANTEE**	Vendor			
33.1	The Vendor shall guarantee the performance of the machine on continuous basis under shop floor working conditions for Line capacity and production output.	Vendor			
34	**PROGRESS REPORTS**	Vendor			
33.1	The Vendor shall submit monthly progress reports showing progress of design, material procurement, manufacturing, assembly etc and any advancement/ delays with respect to the scheduled delivery date.	Vendor			
35	**PACKING:**	Vendor			
35.1	Sea worthy & rigid packing for all items of complete machine, CNC System, all Accessories and other supplied items to avoid any damage/loss in transit shall be provided. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes.	Vendor			
36	**PAINTING:**	Vendor			
36.1	All the machine components shall be painted with high quality Polyurethane Paint. The paint shall have good protection against corrosion and high resistance against chemicals and oil.	Vendor			
36.2	Main Machine / Electrical panels: Apple Green (RAL 6011)	Vendor			
36.3	Safety equipment: Yellow	Vendor			
36.4	Operator console: Light gray	Vendor			
37	**GUARANTEE :**	Vendor			
37.1	24 months from the date of acceptance of the machine.	Vendor			
38	**GENERAL :**	Vendor			

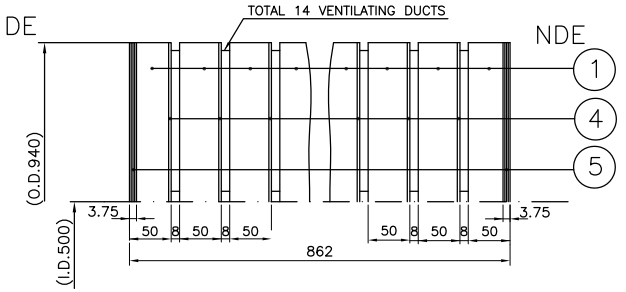
Sr. No.	Description of BHEL Requirement	Specified/ to be confirmed by	Offered	Deviation	Remarks
38.1	Machine Model No.	Vendor			
38.2	Total connected load (KVA):	Vendor			
38.3	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor			
38.4	Total weight of the machine	Vendor			
38.5	Weight of heaviest part of machine	Vendor			
38.6	Dimensions and weight of largest piece for shipment	Vendor			
38.7	Weight and Dimensions of the heaviest assembly / sub-assembly of the Machine	Vendor			
38.8	Dimensions and weight of heaviest piece for shipment	Vendor			
38.9	Drawing showing overall dimensions of the machine	Vendor			
39	Detailed catalogues , sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.	Vendor			
39.1	Hydraulic, Pneumatic & oil piping should be preferably metallic except places where flexible piping are essential. All the pipes required for the same shall be included in the standard scope of the machine.	Vendor			
39	**Evaluation Criteria & Qualifying requirement.**	Vendor			
39.1	Only those Vendor who have manufactured, supplied and commissioned at least **One Linear Tandem Notching Line of six or more stations having same or higher capacity** in past 10 years and such Machine is working satisfactorily as on date of opening of tender, should quote.Vendor to submit the Performance Certificates from customers showing Month and year of commissioning whom similar machine has been supplied earlier for good performance and after sales service after one year of its commissioning and machine has been working satisfactorily as on date of opening of tender. Complete postal address with Name of contact person, Email, Telephone no., Fax No. of the customer whom the said machine is supplied should be furnished	Vendor			
39.2	A list of customers with performamnce certificate and contact details to whom identical/similar machines have been supplied.	Vendor			
39.3	Equipment should meet all our above specification general clauses enclosed and bidders must furnish point-to-point replies against all the points of our above specification and general clauses enclosed failing which their offer may not be considered.	Vendor			

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 24038140133

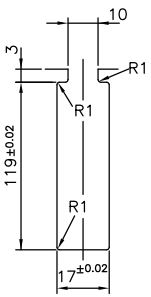




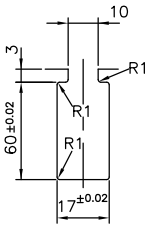
TOOL LIST		
ITEM	TOOL	DESCRIPTION
	1516315	SHAFT HOLE TOOL WITH KEYWAY
	1516316	DAMPER SLOT WITH TRIMING (MAIN)
	1516317	DAMPER SLOT WITH TRIMING (WIDER)
	1591026	SLOT CHECKING GAUGE
	1515403	STACK BUILDING BAR
	1516318	NOTCHING TOOL MAIN (17/60)
	1516321	NOTCHING TOOL WIDER (19/64 & 19/123)
	1591148	SLOT CHECKING GAUGE (16.9mm)
	1446790	STACK BUILDING BAR (16.95mm)
	1516751	LOCATOR FOR PROJECTION WELD
	1516668	LOCATION PLATE FOR PROJECTION WELD
	1516320	NOTCHING TOOL MAIN (17/119)
	1516327	CORE BUILDING FIXTURE
	1516323	BUILDING BAR FOR MAIN SLOT (17x119)
	1516324	DRIVING BAR FOR MAIN SLOT (17x119)
	1516326	CHECKING GAUGE FOR MAIN SLOT (17x119)
	1591761	SLOT DRIFT FOR MAIN SLOT (17x119)
	1611478	BUILDING BAR MAIN SLOT (17x60)
	1611479	DRIVING BAR MAIN SLOT (17x60)
	1611480	CHECKING GAUGE MAIN SLOT (17x60)
	1591761	SLOT DRIFT FOR MAIN SLOT (17x60)
	1515406	BUILDING BAR FOR DAMPER SLOT
	1515407	DRIVING BAR DAMPER SLOT
	1515410	CHECKING GAUGE DAMPER SLOT

TECHNICAL REQUIREMENTS :–

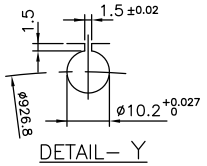
1. FOR ITEM 01 & 02, USE INCUT OF STATOR PUNCHING DRAWING 24036240047 ITEM 01 & 02 RESPECTIVELY.
2. 64 SLOTS L 10.2/1.5+1.5 FOR DAMPER BAR AS SHOWN IN ROTOR CORE PUNCHING ITEM 01 ARE EQUALLY SPACED ON PERIPHERY.
3. 48 SLOTS COMPRISING OF 32 SLOTS NE 17/10x119+3 AND 16 SLOTS NE 17/10x60+3 FOR FIELD COIL (8 SETS OF 6 SLOTS) AS SHOWN IN ROTOR CORE PUNCHING ITEM 01 ARE SPACED AS 64 SLOTS EQUALLY SPACED ON PERIPHERY.
4. 64 SLOTS L 11.2/1.5+1 FOR DAMPER BAR (WIDER) AS SHOWN IN END STAMPING ITEM 02 ARE EQUALLY SPACED ON PERIPHERY.
5. 48 SLOTS COMPRISING OF 32 SLOTS NE 19/11.4x123+2 AND 16 SLOTS 19x64 FOR FIELD COIL–WIDER (8 SETS OF 6 SLOTS) AS SHOWN IN ROTOR CORE PUNCHING ITEM 02 ARE SPACED AS 64 SLOTS EQUALLY SPACED ON PERIPHERY.
6. THE ROLLING DIRECTION IS CONTINUOUSLY CHANGED BY 90° OR 120° IN CONSECUTIVE PUNCHINGS.
7. SPACERS (ITEM 03) ASSEMBLED TO ITEM 02 BY PROJECTION WELDING.
8. WELDING REFER – PRM/TS/002 & 005.
9. PRESSING FORCE OF CORE – 445 kN.
10. SLOT WIDTH FOR WINDING – 17 $^{0}_{-0.3}$
11. SPACER PLATE ASSY. SHALL BE PAINTED TO AM 54173 (PRIMER ONLY).
12. FOR TOLERANCE ON PUNCHINGS REFER AM54193.
13. 5 END STAMPINGS SPOT WELDED TOGETHER ARE PLACED AT CORE ENDS.



DETAIL– Z

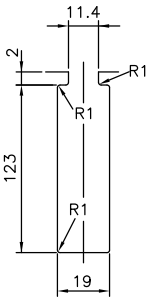


DETAIL– U

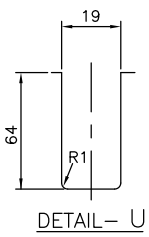


DETAIL– Y

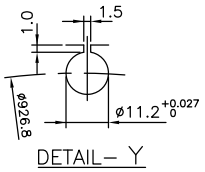
SLOT DETAILS FOR ITEM 01



DETAIL– Z

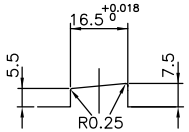


DETAIL– U



DETAIL– Y

SLOT DETAILS FOR ITEM 02



DETAIL– X

GES NO. 404548665 VAR 00

VAR 02	VAR 01	VAR 00	REMARKS	VAR NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	IT.NO. / VAR	MATL. CODE / MATL. SPCN.	A / C	UNIT	QTY.	GS	ZONE	UNIT WT.
–	–	02	SEE T.R. 13	02	05	END STAMPING SET			28							12.0
–	–	14	SEE T.R. 7	01	04	SPACER PLATE ASSY.										4.0
–	64	–			03	SPACER 195 LG.		34028142035								0.025
05	01	–	SEE T.R. 1–5		02	END STAMPING 0.75TK.UNVARNISHED				AA10115						2.4
–	–	1087	SEE T.R. 1–5		01	ROTOR STAMPING 0.65TK. VARNISHED				AA10917						2.085

28 → CARD TYPE–3 | 28 → CARD TYPE–1 | 28 → CARD TYPE–2

ADDITION INFORMATION
W.O.:–44069A425–31

STATUS OF DRAWING

DISTRIBUTION OF PRINT
AME– 01 PRM– 04
PLM– 03
GTG(EM)–01

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
1DQ3937
M/S MSEB NEW PARLI TPS

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE
DRN	ALC		3.2.05
CKD	RPG		3.2.05
APPD	SB		3.2.05

REV	DATE	
		ALTERED
		CHECKED
		APPROVED
ZONE		

DEPT. AME
CODE 404
GRADE OF UNTOL. DIM. C/M/F
SCALE NTS
WEIGHT (kg) 2350
REF. TO ASSY. DRG.
ITEM NO.
NO. OF ITEMS
NO. OF VAR

TITLE
ROTOR CORE

DRAWING NO. 24038140133
REV. 00
SHEET NO. 01
NO. OF SHEET 01

FOR INFORMATION AND TENDER PURPOSE ONLY

REF. DRG. NO. | SIGN. & DATE | INVENTORY NO.

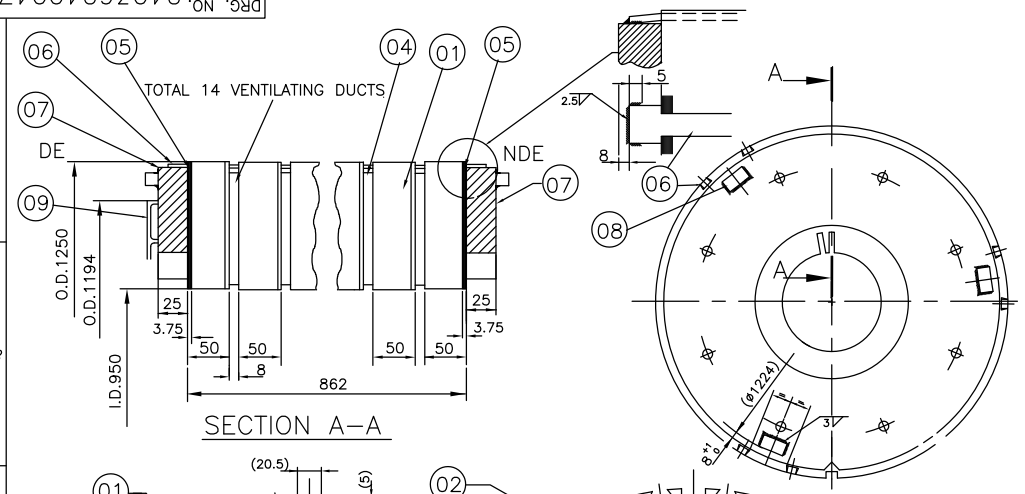
LP/ROTOR/24038140133

SIZE A2

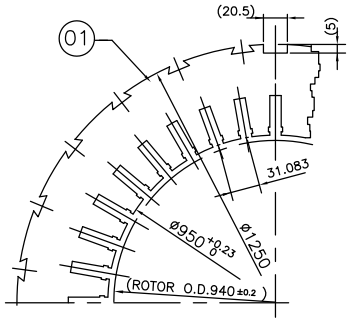
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm.)

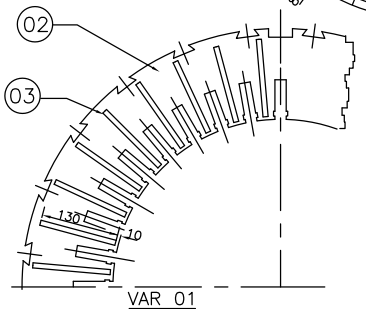
DRG. NO. 24036240047



SECTION A–A

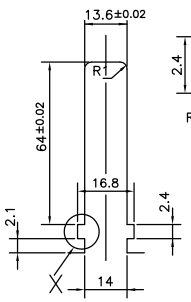


SEE T.R. 6

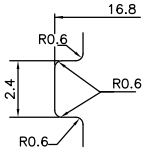


VAR 01

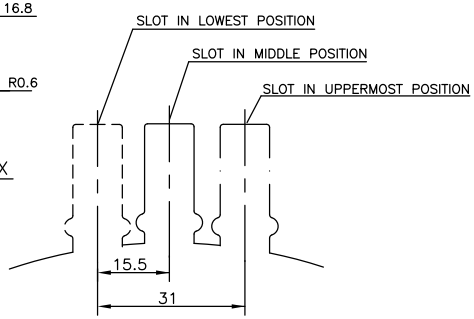
OTHERWISE SAME AS ITEM 01 (SEE T.R.6)



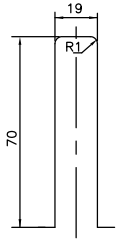
SLOT DETAIL FOR ITEM 01



DETAIL–X



SLOT SKEW THRU PARALLEL SLOT DISPLACEMENT



SLOT DETAIL FOR ITEM 02

TECHNICAL REQUIREMENTS

1– STATOR STAMPING SHALL BE PRODUCED FROM BLANK FOR STATOR STAMPING DRG. NO. 34026244003 IT.1

2– STATOR VENT STAMPING SHALL BE PRODUCED FROM BLANK FOR STATOR VENT STAMPING DRG. NO. 34026244003 IT.2.

3– 96 SLOTS PER CIRCLE.

4– 1 KEYWAY 20.5 x 5 & 24 DOVETAIL SLOT ON O.D.

5– THE ROLLING DIRECTION OF PUNCHING CONTINOUSLY CHANGED BY 90° OR 120° IN EACH SUBSEQUENT PUNCHINGS

6– THE DRAWING SHOWS A STAMPING IN THE CENTRE OF CORE AS SEEN FROM N.D.E. WITHOUT CONSIDERING THE ACTUAL ARRANGEMENT OF COOLING DUCTS .

7– SPACER ITEM 03 ASSEMBLED TO ITEM 02 BY PROJECTION WELDING.

8– AT CORE ENDS, 5 VENT STAMPINGS PLACED TOGETHER.

9– POSITION OF THE MARKING SLOT IN END PLATE TO BE ALIGNED WITH THE KEYWAY SLOT IN CORE.

10– WELDING REF. DOCUMENTS:– PRM/TS/002
PRM/TS/005

11– PRESSING FORCE= 450 kN

12– SLOT WIDTH FOR WINDING = $13.1^{0}_{-0.3}$

13– SLOT FILING SHALL NOT BE DONE.

14– SPACER PLATE ASSY. SHALL BE PAINTED TO AM54173 (PRIMER ONLY).

15– FOR TOLERANCE ON PUNCHINGS REFER AM54193.

TOOL LIST

ITEM	TOOL	DESCRIPTION
	1517390	O.D. BLANKING TOOL
	1611461	NOTCHING & AIR GAP TOOL (MAIN)
	1516312	NOTCHING & AIR GAP TOOL (WIDER)
	1517403	SUPPORT CENTRING PLATE
	1591029	SLOT CHECKING GAUGE (13.6mm)
	1515331	STACK BUILDING BAR (13.6mm)
	1517312	LOCATOR FOR PROJECTION WELD
	1516314	LOCATION PLATE PROJECTION WELD
	1611474	CORE BUILDING FIXTURE
	1590542	BUILDING BAR
	1590543	SLOT DRIFT
	1590544	CHECKING GAUGE
	1517451	LIFTING & O/T FIXTURE
	1517562	T–LOCATOR FOR SPOT WELD
	1516313	SPLITING DIE
	1612637	NOTCHING TOOL FOR WEINGARTEN PRESS
	1612638	SUPPORT CENTERING PLATE WEINGARTEN PRESS

GES NO. 404546686 VAR.00

VAR 01	VAR 00	REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	IT. NO.	MATL. CODE	A C	UNIT WT.	QTY.	VR
–	08	CUT TO LGTH.		09	BRACING STRIP 400 LG.		44026242011	01	BP9093026569				
–	06			08	BLOCK 16SQ.x40		44026242139	01	BP9093029193		0.08		
–	02			07	STATOR END PLATE		24036242013	01			65.0		
–	24	CUT TO LGTH.		06	CLAMP 896 LG		34026242005	01	BP9093027026				
–	10	SEE T.R. 2 & 8		05	END STAMPING UNVARNISHED 0.75TK				AA10115		2.56		
–	14		01	04	SPACER PLATE ASSY.						4.1		
96	–	SEE T.R. 7		03	SPACER		34028142035	11			0.016		
01	–	SEE T.R. 2		02	STATOR STAMPING UNVARNISHED 0.75TK				AA10115		2.56		
–	1087	SEE T.R. 1		01	STATOR STAMPING VARNISHED 0.65TK.				AA10917		2.22		

CARD TYPE–3 | CARD TYPE–1 | CARD TYPE–2

ADDITIONAL INFORMATION: W.O.–44069A425–31

STATUS OF DRAWING:

DISTRIBUTION OF PRINTS: O.C.– 1 PRM– 4 PLM– 3 GTG(EM)– 1

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 1DQ3937 M/S MSEB NEW PARLI TPS

BHARAT HEAVY ELECTRICALS LTD. BHOPAL

	NAME	SIGN.	DATE
DRN	ALC	–sd–	3.2.05
CHD.	RPG	–sd–	3.2.05
APPD	SB	–sd–	3.2.05

REV.	DATE	ALTERED / CHECKED / APPROVED	
02	27.2.10	CHECKED	
		TOOL NOS. 1612637 & 1612638 ADDED.	
02	4.7.05	ALTERED	ALC
		CHECKED	RPG
		APPROVED	
		TOOL NOS. 1590542, 543 & 544 WERE 1611475, 476 & 477.	
01	4/7/05	ALTERED	–sd–
		CHECKED	–sd–
		APPROVED	–sd–
		TOOL LIST UPDATED.	

FOR INFORMATION AND TENDER PURPOSE ONLY

DEPT. AME CODE 404 | GRADE OF UN. TOL. DIM. C/M/F | SCALE N.T.S. | WEIGHT(Kg.) 2650 | REF. TO ASSY. DRG. | ITEM NO. | 75 77 NO. OF ITEMS

TITLE: STATOR CORE ASSY.

1 CARD 3 CODE

7 DRAWING NO. 24036240047 22 23 24 REV 03

SHEET NO. 01 NO. OF SHEETS 01

LP/STATOR/24036240047

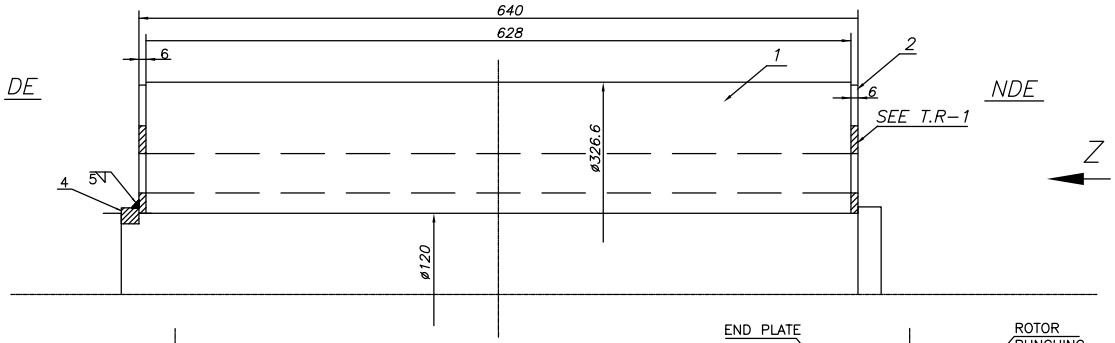
THE INFORMATION IN THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN any WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

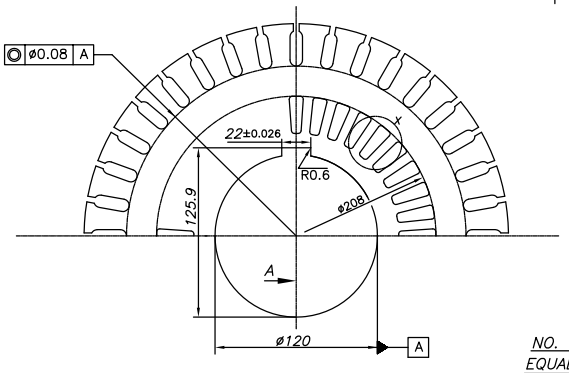
INVENTORY NO. SIGN & DATE REF. DRG. NO.

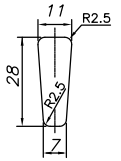
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 2402814145O

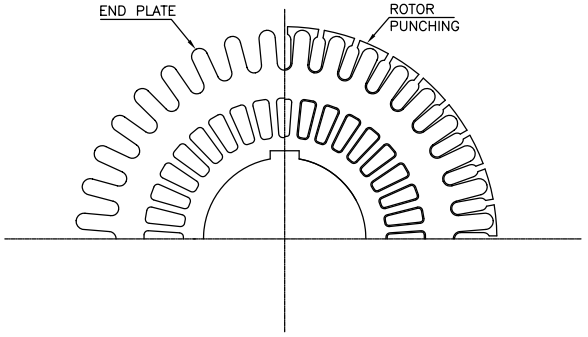






DETAIL-X

NO. OF AXIAL DUCTS=36
EQUALLY SPACED ON 360°



VIEW-Z

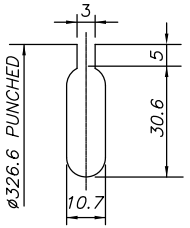
TOOL LIST		
IT NO	TOOL NO	DESCRIPTION
		KEYWAY TOOL
		VENT HOLE TOOL
		SUPPORT PLATE
	1509932	NOTCHING TOOL
		SHAFT HOLE TOOL
		SLOT CHECKING GAUGE (10.7MM)
		STACK BUILDING BAR (10.7MM)
		'T' LOCATOR FOR SPOT WELD
		BUILDING BAR
		DRIFT
		GAUGE

SKEW DETAILS		
SKEW	ANGLE	TIP INCREAMENT(AT CORE MIDDLE)
–	–	–

GES. No. 404588495

TECHNICAL REQUIRMENT:-

1. MADE FROM CIRCULAR ELECTRICAL SHEET STAMPING TO DRAWING 34026244001 IT. 003.
2. ROTOR SLOTS AS PER EDS AM45373 REV 03.
3. CENTER OF ROTOR SLOTS & HALF MOON GROOVE (2DEEP) TO BE ON ONE LINE.
4. MOUNTING OF CORE AS PER FVT 20352.
5. WELDING TO BE TO AA0622101 GR.II.
6. PUNCHING OF KEY WAYS STAGGERED WITH SUCCESSIVE DISPLACEMENT BY 120°.
7. DIRECTION OF SLOT INCLINATION IS DETERMINED BY DIRECTION OF ROTATION OF MACHINE TO ENSURE THE CORRECT SLOT INCLINATION BEFORE SLOT NOTCHING AND CORE ASSY.
8. ENSURE END PLATE CAMBERING (BENDING/DISHING) TOWARDS LAMINATED CORE.
9. ROTOR PUNCHING WITH ENDPLATES TO BE PACKED IN FIXTURE , PACKING FORCE 600KN.
10. ROTOR PUNCHING & ENDPLATE WITH FIXTURE HEATED TO 250° AND MOUNTED ON SHAFT.
11. LOCKING PIECES EVENLY PLACED AROUND CIRCUMFERENCE, THICKNESS CUSTOMIZED UNDER PRESSURE ,REFER FA 20982.
12. ALL END PLATES TO BE ALIGNED AS PER KEYWAYS IN PUNCHING.
13. INSPECTION / TESTING AS PER QVA 0004.



SLOT DETAILS
NO. OF SLOTS = 36
TYPE OF SLOT = NRA

04			04	STOPPER PIECE	AM54014	001	BP9084320484			
~~02~~			~~03~~	~~ROTOR END PLATE~~	~~3402~~	~~001~~				
02	FINGERED		02	ROTOR END PLATE	34028142386	001				22.7
967	SEE NOTES		01	ROTOR STAMPING 0.65TK.						
VAR 01	REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	IT. NO.	MATL. CODE	A/C	UNIT WT.
	CARD TYPE-3			CARD TYPE-1			VAR.	MATL. SPECN.		QTY.
							CARD TYPE-2			

ADDITIONAL INFORMATION
W.O. 47222A401-51

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME – 1 PRM – 3
IMM – 3
GTG (IMM) – 1

TYPE OF PRODUCT 1LA4312-4(SPL) (H-COMPACT) EDS : AM45373 REV03
OR
NAME OF CUSTOMER M/S ESSAR STEEL LTD.

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO.OF VAR.
DRN	SAMEENA		20.05.08	01
CKD	MKM/BK		20.05.08	
APPD	P.B.		20.05.08	

REV.	DATE	ALTERED / CHECKED / APPROVED

DEPT. CODE: AME 404 | UNTOL.DIMS.GR.: C | SCALE: NTS | WEIGHT(K.G.): 350 | REF. TO ASSY. DRG. | ITEM NO. | NO.OF ITEMS

TITLE: ROTOR CORE (UNWOUND)

DRAWING NO. 24028141450 REV. 00

SHEET NO. 01 NO. OF SHEETS 01

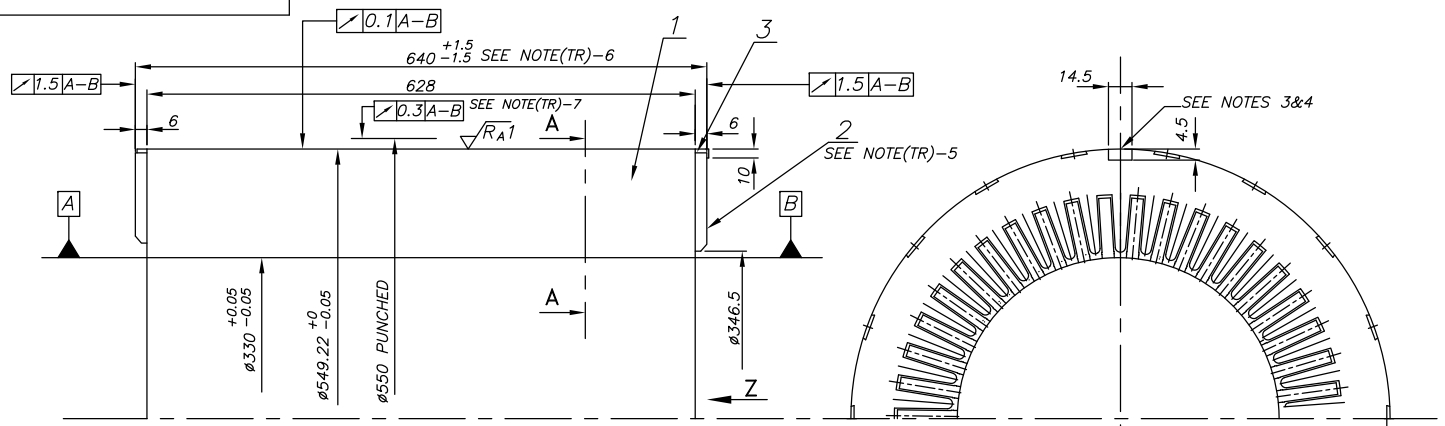
FOR INFORMATION AND TENDER PURPOSE ONLY

REF. DRG. NO. | SIGN & DATE | INVENTORY NO.

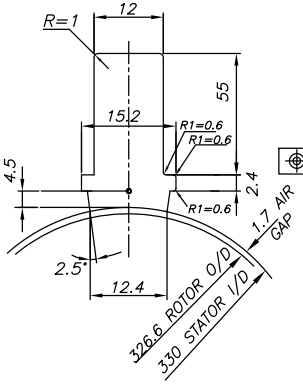
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 24026240768



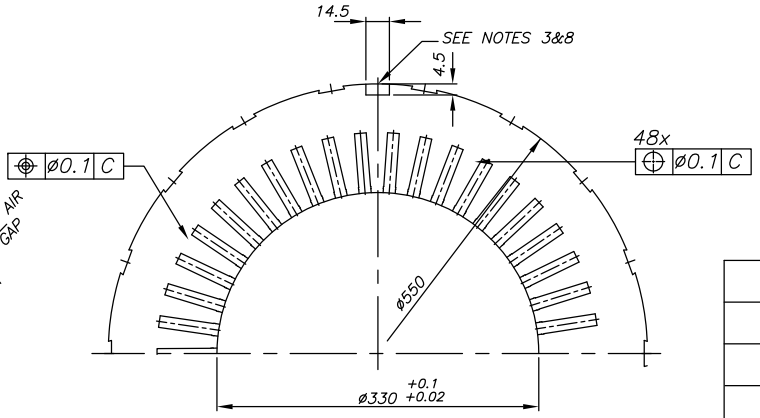
VIEW–Z



SLOT DETAILS

NO.OF SLOTS = 48

TYPE OF SLOT= NJH



SECTION A–A

TECHNICAL REQUIREMENTS :-

1. MADE FROM CIRCULAR ELECTRICAL SHEET STAMPING TO DRAWING 34026244001,IT. 003.
2. MADE FROM CIRCULAR ELECTRICAL SHEET STAMPING TO DRAWING.
3. STATOR SLOTS AS PER EDS –AM45373 REV03.
   CENTER OF KEYWAY AND STATOR TOOTH TO BE ON ONE LINE.
   FOR SKEWED SLOTS THIS IS APPLICABLE TO THE CENTER OF STATOR CORE.
4. PUNCHING OF KEYWAYS STAGGERED WITH SUCCESSIVE DISPLACEMENT BY 120°.
5. RECTANGULAR SLOTS OF END PLATES AND STATOR CORE TO COINCIDE WITH EACH OTHER.
6. STACKING FORCE 100KN.
7. BEFORE MECHANICAL OPERATIONS/TURNING OPERATION.
8. CLAMPS TO BE WELDED TO END PLATES.
9. INSPECTION/TESTING AS PER QVA 0004.
10. PUNCHINGS TO BE COATED WITH STABOLITE 40.

TOOL LIST

IT NO	TOOL NO	DESCRIPTION
001		C' HOOK
001		CORE BULDG.& LOCKING FIXTURE
001		LIFTING & OVERTURNING FIXTURE
001		PRESSING PLATE
001	1509931	NOTCHING & AIR GAP TOOL
001	1507674	KEYWAY DIE
001		BUILDING BAR
001		DRIFT
001		GAUGE
001	–	LOCATION PLATE FOR PROJECTION WELDING Ø
001	1567999	SLOT CHECKING GAUGE (FOR12.0mm)
001	1566060	'T' LOCATOR
001	–	LOCATOR FOR PROJECTION WELD
001	1508655	SUPPORT CENTERING PLATE
001	1508735	BLANKING TOOL O/D.
001	1445791	STACK BUILDING BAR (FOR12.0mm)

GES NO. 404586464

12	CUT TO SIZE 2.0TK x 25 x 800		003	CLAMP 2.0TK. x 25 x 650	44026242133	007		0.53
02			002	STATOR END PLATE	34026242174	01		34.0
967	SEE NOTES 1,3&8		001	STATOR STAMPING 0.65TK				1.33
VAR 01	REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	IT. NO. / VAR.	MATL. CODE / MATL. SPECN.	A/C	UNIT WT. / QTY.

CARD TYPE–3 | CARD TYPE–1 | CARD TYPE–2

ADDITIONAL INFORMATION
W.O. 47222A401–51

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME – 1 PRM– 4
IMM – 3
TEX (IMM) – 1

TYPE OF PRODUCT H–COMPACT EDS AM45373 REV.–03
OR
NAME OF CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO.OF VAR.
DRN	PARVEEN	–sd–	20.05.08	
CKD	B.K/M.K.M	–sd–	20.05.08	
APPD	P.B	–sd–	20.05.08	

REV.	DATE	ALTD / CKD / APPD
01	29.07.08	PARVEEN / A.K.M / M.K.M

VIEW–Z AND SECTION A–A MODIFIED.
FINGER IS ARRANGED BELOW KEYWAY SLOT.
DRAWING REDRAWN.

DEPT. AME | CODE 404 | UNTOL.DIMS.GR. C | SCALE NTS | WEIGHT(K.G.) –

REF. TO ASSY. DRG. | ITEM NO. | NO.OF ITEMS

TITLE
STATOR CORE ASSY
1LA4312–4(SPL)

DRAWING NO. 24026240768 | REV. 01

SHEET NO. 01 | NO. OF SHEETS 01

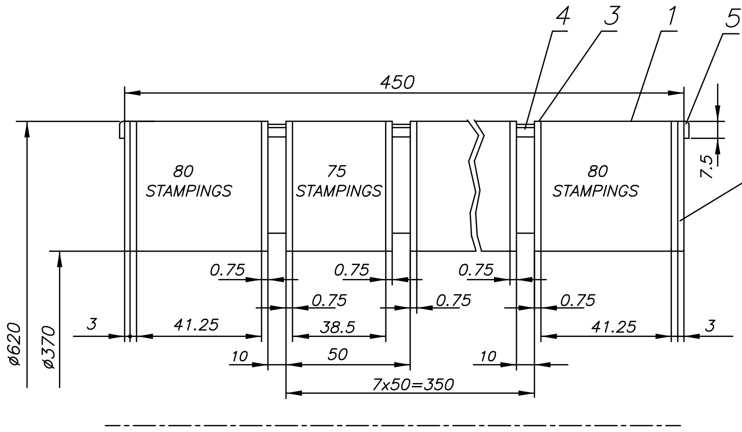
FOR INFORMATION AND TENDER PURPOSE ONLY

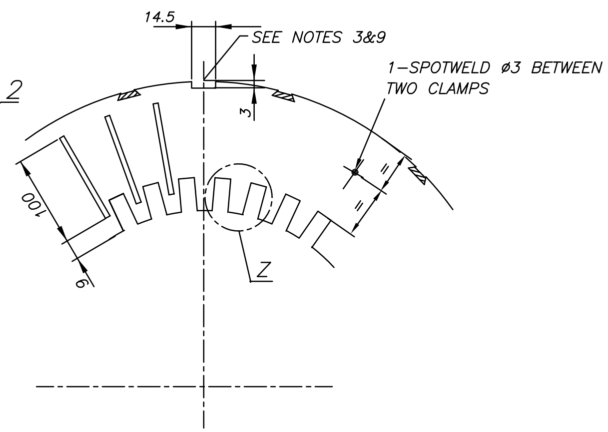
H004213(34026244039)–1LA4314–4 | REF. DRG. NO. | SIGN & DATE | RTCORE4 INVENTORY NO.

FIRST ANGLE PROJECTION

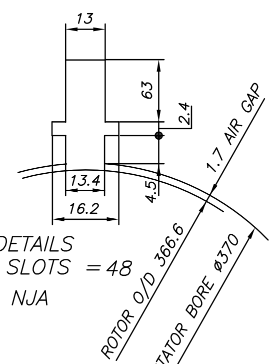
(ALL DIMENSIONS ARE IN mm.)

DRG.NO. 2 402 62 40735

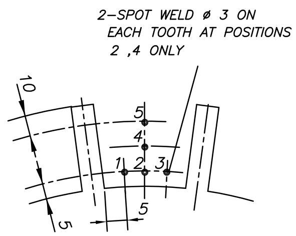




TOOL LIST		
IT NO	TOOL NO	DESCRIPTION
		OUTER DIA BLANKING TOOL
		KEYWAY DIE
	1509907	SLOT DIE
		SUPPORT CENTRING PLATE
		SLOT CHECKING GAUGE
		STACK BUILDING BAR
		BUILDING BAR
		LOCATOR FOR PROJECTION WELD
		'T' LOCATOR
		LOCATION PLATE FOR PROJECTION WELDING ø
		LOCATING KEY BAR
		~~LOCATION PLATE ø TO USE WITH TOOL~~
		~~WIDER SLOT DIE~~
		DRIFT
		GAUGE
		BLANKING TOOL



SLOT DETAILS
NO.OF SLOTS =48
TYPE= NJA



DETAIL-Z FOR SPOT WELDING

VAR 01	REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	IT. NO. / VAR.	MATL. CODE / MATL. SPECN.	A C	UNIT	UNIT WT. / QTY.	GS	ZONE
12			05	CLAMP 2.5x25x465		44026242125	001				0.23		
384	SEE NOTES 5 & 6		04	VENT SPACER 100 LONG		44026242023	001				0.02		
16	SEE NOTES 2,3,5 & 8		03	VENT STAMPING							0.90		
8	SEE NOTES 2,3,4 & 8		02	STATOR END STAMPING							0.90		
685	SEE NOTES 1,3 & 8		01	STATOR STAMPING							0.58		

CARD TYPE-3 — CARD TYPE-1 — CARD TYPE-2

TECHNICAL REQUIREMENTS:-

1. MADE FROM CIRCULAR ELECTRICAL SHEET STAMPING TO DRG.34026244002 IT.01
2. MADE FROM CIRCULAR ELECTRICAL SHEET STAMPING TO DRG.34026244002 IT.02
3. STATOR SLOTS AS PER EDS. AM45346
4. CENTER OF KEYWAY AND STATOR TOOTH TO BE ON ONE LINE.FOR SKEWED SLOTS THIS IS APPLICABLE ONLY TO THE CENTRE OF STATOR BORE.
5. END STAMPINGS SPOTWELD 4 PER SET.
6. VENT SPACER PROJECTION WELDED TO 8 VENT STAMPING.
7. NO OF VENT SPACER = 8 X NO. OF SLOTS AS PER EDS.
8. IN CASE OF VENT PLATES WITH UNEQUAL END PROJECTION LONG END TO BE ON AIR GAP SIDE.
9. FOR CORRESPONDING ROTOR CORE ASSEMBLY, REFER
10. PUNCHING OF KEYWAYS STAGGERED WITH SUCCESIVE DISCPLACEMENT BY 120°

GES NO. 404576799

ADDITIONAL INFORMATION W.O.NO.47191A411-51
STATUS OF DRAWING

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

DISTRIBUTION OF PRINTS
AME - 1 PRM-3
IMM - 3
GTG (IMM) - 1

BHARAT HEAVY ELECTRICALS LTD. BHOPAL

	NAME	SIGN.	DATE
DRN.	MONU JHA		
CHD.	V.K.HIRPATHAK		
APPD.	AKM/MKM		

NO OF VAR.

REV. | DATE | ALTERED / CHECKED / APPROVED.

ZONE

DEPT. AME | CODE 404 | GRADE OF UN. TOL. DIM. C/M/F | SCALE NTS | WEIGHT (Kg.) 425.15 | REF. TO ASSY. DRG. | ITEM NO. | NO. OF ITEMS

TITLE
STATOR CORE UNWOUND
1LA7502-4P

CARD CODE | DRAWING NO. 2 402 62 40735 | REV 00

SHEET NO. 1 | NO. OF SHEETS 1

FOR INFORMATION AND TENDER PURPOSE ONLY

USER2VKH2402624073 5 REF. DRG. NO.
SIGN & DATE
PRINT 5.2.08 INVENTORY NO.