

RAIL COACH FACTORY, KAPURTHALA		
Specification No.	Description	Covering Page
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	

Designation	Name	Signature	Date	Level
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Issue/ Rev	Changes	Date

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	1 of 14	17.12.2019

1.0 IMPORTANT INSTRUCTIONS TO TENDERERS FOR FILLING TECHNICAL BID

- 1.1 Bidders are required to give clause wise comments on the technical specifications, confirming compliance/non-compliance with details of deviations if any along with their effect on the performance. Back references to be avoided, offers are likely to be ignored in case of non-compliance of these instructions for furnishing the information.
- 1.2 Unless otherwise stated, latest alterations/ revisions of specifications/ standards/ drawings shall be applicable. In respect of safety standards and environmental standards relevant to the machine, the machine manufacturers shall ensure compliance with international (CE/ISO/DIN/JIS)/National standards (IS) (wherever applicable).
- 1.3 Tenderers should offer and quote for all the specified concomitant accessories, as these are considered essential for commissioning and utilization of the machine. Even if bidder does not recommend the purchase any of these accessories, the price must be quoted for comparison purposes and their recommendation/suggestion indicated in the offer. Tenderers should also quote for optional accessories, spares and consumable spares as asked in the specifications.
- 1.4 In case, any item is required in sets, please specify nos./pieces per set. This is essential for proper technical evaluation of the offer. Offers received without this may be considered as incomplete and liable to be rejected.
- 1.5 The bidder should quote only for the specified make of sub-assemblies and equipment wherever specified. Makes of sub-systems other than the specified ones will normally not be acceptable. In case, some other make is quoted, specific reasons for the same including its features/advantages over specified makes must be brought out in the offer.
- 1.6 In case there is a contradiction in any information provided (some parametric values given in the specification and those given in the brochure or some other document enclosed by the tenderer), unless specifically mentioned in the deviation cum confirmation statement the values as given in the specification shall be taken as confirmed by the tenderer and offer evaluated accordingly.
- 1.7 The Purchaser may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the Technical Specification. However, the decision of the Purchaser in this regard shall be final.
- 1.8 Purchaser reserves the right to verify the details submitted by the bidder by actual site visits.
- 1.9 Other terms & condition of the contract will be as per Indian Railway Standard conditions of contract.

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	2 of 14	17.12.2019

2.0 PURPOSE

Induction Heater with Demagnetizing Device is required for mounting of fork (80 mm. ID) on Anti Roll Bar so as to expand them and thus facilitate perfect assembly by allowing shrunk fit on the journal

3.0 DESCRIPTION AND SCOPE OF SUPPLY

3.1 The specification covers design, supply, installation and commissioning of Induction Heater with Demagnetizing device. The supply shall include all equipments and accessories which the manufacturer considers essential to make the equipment fully functional when installed and put into operation. Other concomitant accessories/ equipment which the manufacturer considers essential to make the machine fully operational when installed and commissioned with requirement of utilities, etc if any, should be clearly indicated by tenderer in the offer.

3.2 The total value of the offer will be calculated on.

- i. The cost of the basic machine.
- ii. Cost of the concomitant accessories according to tenderer specification.
- iii. Cost of any other accessory treated as concomitant accessory.
- iv. Application duties and taxes, insurance, freight and installation and Commissioning charges.

3.3 Technical experts of the manufacturer during commissioning of machine will fully and adequately trained operators/ maintenance staff nominated by the consignee including repairs of electronics gadgets, sub-assemblies and Printed Circuit Boards up to component level.

3.4 The machine should conform generally to the specification provided in Schedule-I & II of this specification

4.0 GENERAL FEATURES

The equipment should be capable of :

4.1 The induction heating of fork & other components for the range of temperature required as indicated in Schedule-I for attaining necessary shrunk fit assembly. It should have continuous rating without any break or interruption.

4.2 Automatic and reliable heating cycle to be followed by automatic demagnetizing cycle with pre-set temperature control and timer for wide variety of combinations to match the requirement of work pieces.

Dependability, Control & Safety:

4.3 The equipment shall be compact, dependable and reliable in operation and should fully meet the functional requirement under severe working condition with ease and safety.

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	3 of 14	17.12.2019

- 4.4 All controls should be governed by illuminated type coloured push button. Controls for all possible operations should be conveniently located on the fixed panel of the equipment and function of various controls should be clearly indicated in the offer.
- 4.5 Equipment shall be provided with positive temperature control system with an accurate sensing device. The system should ensure that temperature shall not deviate by more than $\pm 2^{\circ}$ C from the pre -set value.
- 4.6 Equipment should be provided with heating as well as demagnetizing device with automatic cut–out and suitable indicator.
- 4.7 Equipment should incorporate all safety devices so as to provide complete protection to the operator and the equipment from all possible operational failures. Suitable interlocking arrangements against instant power overload, sudden power failure, fluctuation in supply voltage, malfunctioning of electrical and electronic components should be provided. All the safety features incorporated in the equipment should be explained in detail in the offer.

MAIN CHARACTERISTICS

- 4.8 The Induction Heating Equipment should be efficiently designed and manufactured to heat fork and other ancillary components. The equipment should have the following essential features.
- 4.9 2 nos. Induction Coils provided at both the sides of the component space to get uniform heating.
- 4.10 Demagnetizing device to nullify the residual magnetism after the completion of heating cycle.
- 4.11 Controlling unit suitably located on a fixed panel board.
- 4.12 The complete unit should be suitably enclosed in rugged electrically insulated box shaped casing.
- 4.13 The equipment complete with all fittings should be mounted on a carriage provided with four directional rollers of standard size and a handle for movement. The whole structure on casters should be sufficiently strong and stable.
- 4.14 The tenderer should indicate the maximum KW capacity of the induction heater for heating the component to attain a temperature of 100° C in about 2 minutes.
- 4.15 The armature of the induction heater should be capable of being used in a wide variety of combinations to match the requirement of work pieces.

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	4 of 14	17.12.2019

- 4.16 Heating effect by induction should take place only on pieces. The heater casing and the armature should remain cold throughout the cycle so that they can be touched without risk.
- 4.17 A proper selector switch should be provided to obtain required temperature for different components.
- 4.18 A suitable control system should be provided to ensure that the temperature should not deviate by more than $\pm 2^{\circ}\text{C}$ from the pre-set value. A suitable timer should be provided to control over time for attaining the required temperature and to avoid over heating. An emergency 'OFF' button should be provided to facilitate an interruption in heating cycle.
- 4.19 The equipment should be provided with a suitable demagnetizing device which shall automatically demagnetize the work piece at the end of each heating cycle. A demagnetizing indicator shall also be provided. The system should ensure residual magnetism of less than 2 A/cm after the completion of cycle.
- 4.20 A buzzer shall be incorporated with the equipment to be switched off as soon as the required temperature is attained and demagnetizing process is completed.
- 4.21 The control panel must be provided with a door and a lock, strong enough to prevent tempering when the equipment is not in use.
- 4.22 The working surface of the heater shall be at convenient height to avoid strain to the worker.
- 4.23 Suitable non-magnetic insulated supports with proper contour should be provided for supporting the work piece during heating and facilitate easy handling during loading and unloading of work piece to and from the equipment.
- 4.24 The equipment should be suitable for service in an ambient temperature varying from 0°C to 50°C with a relative humidity of maximum 95%.
- 4.25 A provision of Auto cut at a particular temperature shall be provided in the machine.
- 4.26 Time and Temperature should be displayed (digital type)
- 4.27 Temperature of heated component should be indicated on machine.
- 4.28 Machine should be covered properly to avoid dust/water.
- 5.0 ESSENTIAL CHARACTERISTICS AND TECHINCAL PARAMETERS.**
- 5.1 Safety Features:**

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	5 of 14	17.12.2019

5.1.1 The Machine shall incorporate all safety devices so as to provide complete protection to the operator and machine against all possible operational and machinery failures and those should be indicated clearly in the offer.

5.1.2 Suitable interlocks should be provided to prevent machine operation in the event of :

- i) Faulty sequence of operation.
- ii) Fluctuation in supply voltage.
- iii) Power failure.
- iv) Failure of hydraulic system.
- v) Failure of pneumatic system.
- vi) Drop / increase in lubrication pressure.
- vii) Exceeding max. Temperature range.
- viii) Protection against short circuit & thermal overload.
- ix) Auto shut off in case of failure of cooling system.
- x) Auto compensation for lost coolant along with level indicator.
- xi) An audio-visual alarm to start and continue for about 10-15 sec after the end of heating cycle.
- xii) Suitable time relays.
- xiii) Soft start & Auto ramp ring cycle to avoid current surge due to sudden switching to full power.
- xiv) Safety device against overload for all relevant mechanism and electronic/ electric circuits.
- xv) Safety stops against over running of all slides.
- xvi) Interlock against conflicting motions.
- xvii) Emergency master stops should be provided on easily accessible location.

5.1.3 As far as possible suitable protection covers should be provided on all guideways, lead screws etc. to prevent damage by chips etc.

5.1.4 Any other feature to prevent /avoid damages to men, machines or materials incorporated may be indicated in the offer.

6.0 CONCOMITANT ACCESSORIES

The price of equipment should include the cost of all accessories as given below.

- a) Induction coils Left hand & Right hand (one each) 2 nos.(Total)
- b) Temp. Probe with cable & socket- 1 no.
- c) Timer with Demagnetizing Device unit-1 no
- d) Handheld digital thermometer (0-500o) with probe DT-01 - 1 no
- e) Measuring instrument for residual magnetism - 1 no.
- f) Electrical cable for connecting to mains supply - 10 mtr.
- g) Hand gloves - 2 pairs
- h) Set of maintenance tools (List to be furnished) - 1 set
- i) Dry type quick connecting coupling For electrical and coolant connection (Each set comprising of two male portions as female portions should be built in the main Body and coils) - 2 sets
- j) Length of coolant pipe from main body to coil - 5mts.

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	6 of 14	17.12.2019

k) Length of electrical cable from main body to coil - 5mts.

7.0 OPTIONAL ACCESSORIES

Any other accessory, which is in the opinion of the tenderer can contribute to higher production rates, should be indicated and quoted separately mentioning prices of each accessory.

8.0 SPARES

- 8.1 The tenderer should furnish details of spares covered under warranty.
- 8.2 List of important spare parts and accessories with their part number and costing.
- 8.3 The tenderer should be furnishing the price list of spare parts required for two years normal maintenance of the equipment. Sources of supply of spares used other than that of manufacturer should be furnished by the tenderer.
- 8.4 List of recommended spares for normal maintenance after expiry of warranty period to till useful life of the equipment and these spares should be readily available in the market with your authorised stockists.
- 8.5 List of recommended consumables for two years shall be quoted separately.
- 8.6 Useful life estimated/expected for each equipment and its sub assembly should be indicated by the tenderers

8.0 INSPECTION, INSTALLATION, COMMISSIONING AND PROVING OUT

8.1 Inspection of Equipment & Testing at Manufacturers Works

- 8.1.1 Manufacturers must have suitable facilities at their works for carrying out various performance tests on the equipment. The tenderer should clearly confirm that all the facilities exists and shall be made available to the inspecting authority.
- 8.1.2 A load and functional test must be carried out at the manufacturer's works. Reliability of the equipment shall be demonstrated to the satisfaction of the appointed inspector or inspecting agency.
- 8.1.3 A sample inspection chart for inspecting the equipment should be supplied along with the bid.

8.2 Installation Commissioning and Proving Tests

- 8.2.1 The contractor or his agent shall be required to carry out a joint check at the consignee's end along with the consignee before unpacking is done to avoid subsequent complaints regarding short shipment or transit damages. It is necessary that consignee to avoid commissioning delays due to shortages/transit damages do this joint inspection immediately on receipt of the machine.
- 8.2.2 The Successful tenderer shall have to commission the machine within 30 days from the date of receipt of machine at RCF,Kapurthala.
- 8.2.3 The successful tenderer shall have to prove out the performance of the machine at RCF premises to the entire satisfaction of the consignee.

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	7 of 14	17.12.2019

- 8.2.4** The supplier should take full responsibility of commissioning the unit & training of the Intended user.
- 8.2.5** User shall also be trained in using day to day maintenance & cleaning of unit.
- 8.2.6** Any precaution & extra care intended in the use of the equipment should be explicitly informed.
- 8.2.7** If an assembly/sub assembly is required to be taken back to the manufacturer's premises for repair/replacement either before commissioning or during warranty, the manufacturer or his agent would be required to submit an Indemnity Bond. In case the entire machine has to be taken back, a Bank Guarantee would have to be submitted. The Indemnity Bond/Bank Guarantee should be of adequate value so as to cover the cost of the assembly/subassembly/paid-up cost of the machine.

9.0 ELIGIBILITY CRITERIA

- 9.1 The tenderer shall be registered on IREPS website (www.ireps.gov.in) to participate in the tendering process.
- 9.2 The tenderer shall have established quality control system and organization to ensure adequate control at all stages of the manufacturing process.
- 9.3 The tenderer shall provide a performance statement giving a list of major supplies of same/similar equipments effected in last 5 years to the reputed organizations giving details of the order no. and date and the quantity supplied and whether the supply was made within the delivery schedule. Such period shall be reckoned from the date of opening of tender. Tenderer should also provide the prove out test certificate of his supply/supplies.
- 9.4 Tenderer not submitting the requisite information may note that his offer is liable to be ignored.

10.0 TECHINCAL LITERATURE

- 10.1 One copy of the printed illustrative catalogue showing isometric view/sketch & features of the machine and its elements must be enclosed with each copy of the bid.
- 10.2 The successful tenderer will have to furnish for each machine 02 copies of spare parts catalogue giving the part list number of each component with exploded views and assembly drawings, maintenance manual, trouble shooting guide, operational manual of the machine.
- 10.3 Document in the service / technical manual. Firm shall also provide time within which all service calls shall be attended.
- 10.4 A Circuit diagram for sequence of operations must be supplied in maintenance & operation manuals. Each element in the diagram should be suitably numbered & correspondingly labelled for the convenience of the operating & maintenance staff.

11.0 SPECIAL FEATURES

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	8 of 14	17.12.2019

Special features incorporated into the machine, if any shall be indicated separately by the tenderer, clearly indicating the advantage of these features.

12.0 **MAKE**

- 12.1 The supplier shall clearly mention whether the system quoted is Indian make or imported. If Indian make, the tender should be accompanied by duly sanctioned factory license & relevant documents & also produce records of installation & satisfactory after sales service performance of their equipment from at least one govt. Institution of similar or large size for duration at least 3 Years duration.
- 12.2 If imported item, the OEM firm should be registered for operations in India for a minimum period of last 3 years. In case this is not so, the dealer should be authorised regional supplier & service provide for the late 3 years. He should also produce installation & satisfactory after sales service record of duration at least last 3 years from at least one govt. Institution for a system of similar or larger size. Further the tender should be accompanied by authorisation certificate from OEM.
- 12.3 The supplier shall furnish the complete details of Model No. Make & Manufacturer's details/ address, Country and authorization details of Dealership.
- 12.4 The firm shall provide the calibration certificate of National / International Traceability along with validity of at least two years.

13.0 **SERVICING FACILITIES**

- 13.1 Service facility in Punjab, Address and contract details including phone and fax no. to be provided. The facility should have the necessary equipments recommended by the manufacture to carry out preventive maintenance test as per guideline provided in the service / maintenance manual. Firm should provide list of equipment available for providing calibrations and routine maintenance support as per manufacturer.
- 13.2 Supplier will undertake for service repairs & replacement of any needed part as & when needed.
- 13.3 Maintenance contract to be quoted after the expiry of maintenance period quoted above with details of scheduled visits, part covered under contract & cost of parts not covered as well.
- 13.4 The tenderer shall clearly spell out in the offer about the facility available with him or his agent/dealer for providing adequate after sales service in Punjab during warranty period.
- 13.5 The tenderer shall also indicate the service organization located at various places in India and availability of trained staff, maintenance spares etc.
- 13.6 The contractor shall give a comprehensive spare part list with OEM details and price for all the sub systems.
- 13.7 The tenderer/contractor shall provide list of spares, consumables required for maintenance for 5 years after completion of warranty period
- 13.8 For maintenance during warranty following criteria shall be considered.

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	9 of 14	17.12.2019

- A) Service engineer of the supplier shall be available for attending to the system faults during first 07 days after successful commissioning of equipments during 09.00 - 17.00 hrs on all working days including Saturdays.
- B) Service engineers shall visit RCF on quarterly basis thereafter till the end of warranty/extended warranty period for Preventive Maintenance at least for one full day at a time.
- C) In case of any breakdown affecting the performance of the system completely or partly, firm shall depute its service engineer as soon as and when informed by any suitable means like Fax, SMS or email possible after receiving such call.
- D) Breakdown period shall be calculated from 8 hours after it's reporting to the firm upto the time it is attended. If intimation to the firm is delayed from Railway's side, then the breakdown period calculation will start from the time by which it is reported to the firm.
- 13.9 Total up time of the system should be at least 90%. Up time shall be counted in following manner:-
- A) Total breakdown of less than 8 hours shall be ignored for the purpose of this calculation.
- B) Penalty may be imposed if the down time is more than 10% without any valid reasons. The levy of token penalty as deemed fit based on the merit of the case may also be consider as per clause 17 (b) of GCC -201.
- 13.10 Warranty period for part or machine shall be extended after completion of warranty period by the duration under which the part or machine remains under breakdown during warranty.
- 13.11 Tenderer shall provide list of spares, consumables required for maintenance for 5 years after completion of warranty period as per annexure-A
- 13.12 Tenderer shall provide expected life for the components of the system and provide the maintenance schedule required for 10years for as per annexure -A
- 13.13 Tenderer shall provide the service charges /per day/per man for deputing service engineer on the machine on requirement separately for Indian and Foreign engineer.

14.0 DEVIATIONS:

The tenderer should clearly certify that the machine offered fully meets the specification various design features incorporated in the machine to fulfil different technical performance requirements should be fully explained in the offer. However, minor deviations from this specification, which do not affect or in any way interfere with the stipulated performance standards, or would result in improved safety/reliability or would reduce recurring maintenance/operating cost of the machine, can be considered for acceptance.

15.0 SCHEDULE OF ANNUAL MAINTENANCE CONTRACT (AMC) FOR PERIOD OF 5 YEARS AFTER COMPLETION OF WARRANTY PERIOD

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	10 of 14	17.12.2019

- 15.1 Tenderer shall provide proposal for 5 year Annual Preventive Maintenance schedule to be executed after completion of warranty period in the format as per annexure-B.
- 15.2 The firm shall maintain the machine in good working condition during the contract period and shall correct the fault or failures, repair or replace the worn or defective parts/equipment during the normal working hours of shop where the equipment has been installed. Unserviceable parts/equipment need to be replaced at no extra cost with brand new parts/equivalent or superior specification.
- 15.3 The firm shall respond by deputing service personal to oral / telephonic/ or other modes of intimation for repair and maintenance of the said machines within 2 hours.
- 15.4 The firm shall ensure that the machine is in proper working condition, to the full capacity, after repair and maintenance.
- 15.5 To have a timely supply of spares during AMC, the contractor shall furnish a total list of spares which should contain list of spares that shall be arranged by the firm, both chargeable, duly mentioning the charge against each item, and spares which shall be non-chargeable, and list of spares to be held by RCF.
- 15.6 The contractor shall clearly list-out the list of consumables required for day-to-day operation of the machine. It shall be the scope of RCF to arrange the consumables once the completion certificate is issued for the retrofitted machine.
- 15.7 The tenderer/contractor shall provide suitable standby when repairs exceeds 2 hours. When any equipment is taken for repair to the tenderer/contractor's premises suitable standby equipment should be provided.
- 15.8 Besides attending the breakdown calls, the firm shall attend to the corrective and preventive maintenance of the machines once in a month.
- 15.9 The AMC is valid for five years from the date of completion of the warranty period . No freight is admissible.
- 15.10 During the AMC period, whatever equipment is defective shall be handed over to RCF. During completion of the AMC period the machines should be handed over in full working condition to its full capacity.
- 15.11 The firm should maintain a register duly indicating the nature of defects and repair attended and got signed by RCF authority. Preventive maintenance schedule should be made. The schedule should be made in such a way that more than one machine should not be attended on the same day. A copy of the schedule should be given to RCF at the beginning of the AMC and the schedule should be strictly followed and on carrying out the preventive maintenance the same should be entered in the register and got signed by RCF authority.
- 15.12 AMC charges shall be paid quarterly as one quarter of the total AMC charges applicable for that year on submission of bills duly certified by the engineers in charge with regard to the satisfactory execution of AMC during the period for which the bill is claimed. Duties & taxes as applicable at the time of payment shall be deducted at source.

ANNEXURE-A

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	11 of 14	17.12.2019

S.N.	ITEM	PART NO.	SERVICE LIFE	PRICE

ANNEXURE -B

S.N.	YEAR	AMC CHARGES
1.	IST YEAR	
2.	IIND YEAR	
3.	IIIRD YEAR	
4.	IVTH YEAR	
5.	VTH YEAR	

16.0 WARRANTY

As per IRS conditions or as quoted by the tenderer whichever is later.

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	12 of 14	17.12.2019

SCHEDULE-I

S.No.	Parameter	Value
1.	Power Supply	200 to 250 Volts
2.	Type of supply	50 Hz +/-3%cycles single phase AC
3.	Time Control	Upto 1200 second continuously variable.
4.	Temperature Control	Upto 300°C continuously variable.

5. The following information shall be furnished by the tenderer in the offer:
- i) Heating time required to attain necessary temperature with VA load.
 - ii) Demagnetizing time.
 - iii) Total floor to floor cycle time.
 - iv) Electric supply & KW rating.
 - v) Transformer capacity.
 - vi) Dimension of the equipment.
 - vii) Height of the heating table above floor.
 - viii) Net weight of the equipment.
 - ix) Sensitivity of the equipment in case of:
 - a) Pre-set heating temperature.
 - b) Residential magnetism (after demagnetizing operation).

Note: Tenderer to furnish following detail of the Induction Heater with Demagnetizing Device offered

S.no.	Technical Parameter	Offered by Tenderer

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	13 of 14	17.12.2019

SCHEDULE-II ELECTRICAL SPECIFICATIONS

1.0 STANDARD

- 1.1 The electrical equipments shall comply with the latest Indian, Electricity rules as regards safety requirements and the essential provision of the act, applicable to installation and operation of the equipments.
- 1.2 All equipments and material shall comply with appropriate Indian standards (latest) or National standards of the country of origin.
- 1.3 The tenderer shall indicate the specification to which different equipments are being supplied will confirm alongwith the offer.

2.0 ATMOSPHERE CONDITIONS

Ambient temperature 0°C to 50°C. Maximum relative humidity 98%.

3.0 POWER SUPPLY

- 3.1 The electrical equipment should be suitable to work unbalanced 3 phase, 50 HZ, 3 wire or 4 wire system or single phase A.C. supply.
- 3.2 Frequency may vary up to 50 ± 3% HZ.
- 3.3 The supply voltage may vary upto 400+10% -15% 3 phase or 230V ± 10% (single wire).
- 3.4 Equipment should be capable of withstanding spikes and transients in the input supply.

4.0 EQUIPMENT SHALL HAVE PROTECTION FOR FOLLOWING

- 4.1 For over load and short circuit, protection shall be with MCB of standard Kopp/MDS/L&T/other reputed make.
- 4.2 Voltage, ammeter and temperature indicator shall be provided on the front panel. All particulars as asked for in the annexure shall be furnished.

5.0 OTHER TECHNICAL REQUIREMENTS

- 5.1 Induction coil should be replaceable at site, encapsulated in PVC are not acceptable.
- 5.2 Circuit should be with contactor logic for easy maintenance. Micro processor circuit not acceptable due to working condition.
- 5.3 Equipment shall be provided with temperature mode & timer mode.
- 5.4 Equipment should be capable to control the power with 25%, 50%, 75% capacity to avoid sudden rise in temperature.
- 5.5 The roll sliding arrangement should be so designed that the YOKE gets lifted mechanically and rolls off from vertical supports without rubbing or damaging the left and right induction coil.
- 5.6 All particulars as asked for in the annexure shall be furnished
- 5.7 All indication lamps should be LED cluster type make L&T, BCH, Siemens only.

RAIL COACH FACTORY, KAPURTHALA			
Specification No.	Description	Page No.	Date
Mech/M&P/3400/GM/01 Rev.- NIL	Induction Heater with Demagnetizing Device	14 of 14	17.12.2019

**ANNEXURE-I
DETAILS TO BE FURNISHED BY THE TENDERER**

1.0 TECHNICAL PARTICULAR OF INDUCTION MOTORS (IF APPLICABLE)

- a) Size of conductor.
- b) No. of turns.
- c) Size of core used.
- d) Class of insulation.
- e) Class of duty.
- f) Rated out-put in K.W.
- g) Rated voltage and current at rated out-put.
- h) Temp. rise above ambient temp.
- i) Type of enclosure.
- j) Degree of protection of enclosure.
- k) Make

2.0 TECHNICAL PARTICULAR OF CONTROL GEAR

- a) Manufacture name and trade make.
- b) Rated operational voltage rated current.
- c) Class of duty.
- d) Rated thermal current of each conductor.
- e) Rated short circuit making capacity.
- f) Rated short-circuit breaking capacity.

3.0 PROTECTION PROVIDED

- a) Short circuit protection.
- b) If yes give short circuit rating Yes/No
- c) No voltage trip Yes/No
- d) Over load trip. Yes/No

4.0 CONTROL PANEL

- a) Make of control panel.
- b) Degree of protection provided.
- c) Dimensions.
- d) Permissible temp. rise.

5.0 MAKE OF COMPONENT PROVIDED

- a) Induction coil.
- b) Contractor.
- c) Relays.
- d) Volt meter.
- e) Ampere meter.
- f) Pyrometer.
- g) Timer.
- h) MCB.