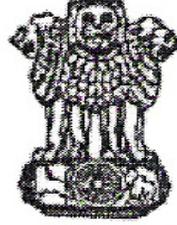


भारत सरकार
Government of India
रेल मंत्रालय
MINISTRY OF RAILWAYS



सत्यमेव जयते

TECHNICAL SPECIFICATION
FOR
STATIONARY FLASH BUTT WELDING PLANT
AND
CONNECTED MACHINES & ACCESSORIES

(NO. IRS-T-49-2019)

अनुसंधान, अभिकल्प एवं मानक संगठन, लखनऊ -11

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CORRECTION SLIPS

S.No.	Correction Slip No.	Date of Issue	Subject	Clause No(s) affected	Remarks

Technical Specification for Stationary Flash Butt Welding Plant and connected machines & accessories

0.0 General:

0.1 Stationary Flash Butt Welding Plants working in Indian Railways are of old vintage. These plants are to be replaced with plants of state of art technology prevailing at present. The old plant may have to be continued in service as per discretion of Railway administration. It is intended that suitable layout keeping available infrastructure viz. Rail handling system, Rail loading and unloading system etc. in view is decided by the supplier of plant.

The capability of plants and equipments will have to physically demonstrate for prevalent rail sections on Indian Railways. For Rail sections and UTS, which is not in use at present, theoretical calculations shall be furnished to demonstrate the capabilities.

0.2 This technical specification has been drafted to reflect the performance and quality requirements of the Stationary Flash Butt Welding Plants. Bidders are requested to carefully study the specification and ensure that their equipment fully complies with these specifications. Thereafter, if a bidder feels that his equipment can substantially meet the performance and quality requirements laid down herein but does not fully satisfy a particular item of this specification, he shall mention the deviations, if any, in the statement of deviation from the specifications, giving the details how the functional requirements of this specification are going to be met with.

0.3 The bidder shall specify the model of Flash Butt Welding Unit and related equipments offered and furnish a detailed Technical Description of the same. System/sub-systems and working mechanisms of the machine shall be described in the "Technical Description" in detail along with the sketches to show the manner in which the requirements of the specifications are accomplished by the offered model of flash butt welding machine.

0.4 The tenderer shall furnish video showing the working of each machine in real time under field conditions on compact disc/USB stick/any other means. In case, the tenderer intends to offer the improved version of Automatic Flash Butt Welding machine for welding of rails, for which video is not available, he can submit the video of his existing working plant with description of changes proposed and a walk through 3-D simulation model of proposed plant. Photographs of the machines offered and technical literature shall also be enclosed with the offer. The photographs shall also show close-ups of various working assemblies/systems of the full Plant.

0.5 All machines including flash butt welding machine should be well synchronized, durable, easy to maintain and of robust design. Machines should be able to cope up the forces coming during the operation.

The tenderer shall be either manufacturer of the Automatic Flash Butt Welding Plant for welding of Rails or accredited agent of manufacturer. It shall be clearly specified whether other equipments are manufactured for tenderer or are bought out item. In case of bought out item, the model name and name of manufacturer shall be clearly indicated.

1.0 Description/Scope of Work:

1.1 Flash Butt Welding Plant normally consisting of following machines/equipments/components:

(i) Automatic Flash Butt Welding Unit (hereinafter called FBW machine) with

(a) Automatic stripping/ trimming unit.

(b) Programmable Logic Control (PLC)

(c) Weld data recorder

(d) Smoke trapping device

(e) Automatic cooling device

(ii) Equipment for post weld heat treatment

(iii) Standby Diesel generator

(iv) Rail end brushing/ cleaning machine

(v) Fully automatic weld profile grinding machine

(vi) Rail straightening machine

(a) Pre-straightening machine

(b) Post weld straightening machine

(vii) Automatic punching machine capable for punching weld identification number as per Para 9 of the Manual for Flash Butt Welding of Rails-Revised 2012.

All above plant and equipments shall be capable of welding/ handling rails of section upto 68kg/m with ultimate tensile strength upto 130 kg/mm².

1.2 This specification broadly covers the Working Mechanism & Functional Requirements. The scope of work under this specification also covers installation of the plant, Training of the staff, Layout, Foundation of the machines, Instruction manuals, Inspection, Additional information, Equipment Environment, Warranty, Annual Maintenance Contract (AMC)etc.

2.0 Automatic Flash Butt Welding Machine:

2.1 **Weldability and range of application :**

The FBW Machine should be designed for welding rails up to 68 Kg/m having ultimate tensile strength up to 130 Kg/mm².

The plant shall be capable to weld new rails/ released but serviceable rails of various sections and metallurgies specified in Indian Railway's Standard Specification for Flat Bottom Rails(IRS-T-12-2009) with up to date Addendum and Corrigendum slips (hereinafter called Specification of Rails) viz. 52/60/68Kg/m of grades 880(C-Mn, Cu-Mo, Ni-Cr-Cu, Niobium, Vanadium), 1080(HH, Cr). Plant would also be capable of welding of 60/68 Kg/m rails having mechanical & chemical properties of R350HT of BS EN 13674-1:2011+A1:2017.

The machine should have facility for traversing by at least 500mm to facilitate central positioning of the ends of long welded rails.

2.2 Machine Body:

The Machine body should be preferably of a frame type construction capable of taking clamping and upset force to their axes of action. The machine frame should have large openings in front of the welder to facilitate quick removal and replacement of welder dies and clamps and to provide maximum visibility for operation and maintenance. The machine frame assembly should be sturdy, all welded steel fabrication suitably braced and stiffened at points of stresses to minimize deflection and thermally stress relieved. The machine frame top should have a single continuous beam structure to minimize welded joints, so that deflection/ distortion/ cracks may be avoided. The weld zone should be fully covered with spatter guards to trap the flash and a fume extractor to be provided to exhaust this chamber. Guides should be provided at entry, and within the machine, to enable free passage for rails during entry and transport. The welding standard followed for manufacturing of machine should conform to latest Indian Standard or equivalent International Standard. The manufacturer should specify the standard followed and certify that it meets the welding standard.

2.3 Production Capacity:

The hourly output in terms of number of welded joints should not be less than 20 for 60 kg 90UTS, 13m rails including insertion of rails, clamping and aligning rail ends, matching rail ends through power adjustment, welding cycle, stripping of upset, unclamping and resetting of machine. The plant should be capable of welding 260m long rail panels by continuous welding of 13/26/65m rail lengths.

The time in seconds for various operations per joint like positioning of welding machine, clamping and aligning the rail ends, matching rail ends through powered adjustments, welding cycle, placing stripper in position, stripping of upset metal, unclamping and resetting of machine etc. shall be indicated.

Total rail usage per weld should be within 30mm.

2.4 Quality of Weld:

The welded joint produced by the machine should meet the various test standards and geometrical tolerances specified in the Manual for Flash Butt Welding of Rails- Revised -2012 with up to date Addendum and Corrigendum slips (hereinafter

called FBW Manual). The machine offered shall be capable of producing consistently and fully automatically weld to meet these stipulations.

The machine should be controlled by a PLC of latest version of a reputed manufacturer which monitors all the vital parameters of the process such as Voltage, Current, Displacement, Pressure, Time intervals, Velocity and Duration of flashing etc. The parameters are also recorded and displayed on a Weld Data Recorder as required. The PLC should also have a self diagnostic arrangement. If the rail weld does not meet the preset values, suitable error indication shall be shown whether the weld joint is “Good” or “Bad” and the operation should stop automatically.

The software deciding the acceptance of welds based on different weld parameters should be tailor made. Bandwidth for different rail sections and chemistry should be specific and narrow one.

2.5 Clamping Units:

The clamping unit should be capable of applying a load suitable for different section of rails i.e. upto 68 Kg/m. Multiple clamps to be provided for holding the rails to prevent slippage during butting operation and to prevent abnormal indentation of the rails. The bidder should specify the details of clamping cylinders and ratio of clamping and forging force.

2.6 Forging Unit:

Forging unit should be of air/oil intensified type capable of applying forging force suitable for welding rails up to 68 Kg/m. The rams of forging unit shall be so placed so as to ensure equal distribution of the forging load across the interfaces. The control includes a servo system, which should be controlled by the PLC for fine control on the velocity of flashing. The forging action, which has to be as fast as possible, should be accomplished with the help of a gas charged accumulator. The accumulator system must be connected to filled/charged Nitrogen cylinder with required pressure gauge and other necessary fixture. If any deficiency of nitrogen gas is observed in accumulator, then it must be easily recouped by nitrogen cylinder. The unit should be capable of delivering suitable force for welding 68 Kg/m rails with UTS of 130Kg/mm².

In view of the heavy force involved, certain interlocks should be incorporated in the system. The weld initiation should not be done without clamping. Similarly, the machine should not retract after welding unless de-clamped. This is to avoid application of tensile force on the still plastic joint inadvertently after welding.

2.7 Welding Electrodes:

These are to be of copper alloy with high abrasion with relatively good conductivity and water cooled with quick release facilities for maintenance and replacement.

Metallurgical composition of copper alloy electrodes to be specified to take care of replacement of electrodes in case manufacturers do not support servicing of FBW

unit after certain period. Suitable welding electrodes should be provided for the rail sections upto 68 Kg/m to be welded. Arrangement should be provided to blow off scale and flash from the electrodes. Electrodes supplied with machine shall be the part of welding machine.

The codal life of the electrodes in terms of number of welds should not be less than 25000. The number of spare electrodes supplied with the machine shall be two sets. The electrode holders shall have a provision for vertical adjustment to compensate the wear up to 25 mm.

The equipment to cool the water circulated in electrode should be included with the machine.

2.8 Breaking & Inching Mechanism:

The welding machine should be provided with an independent breaking and inching mechanism on each side so as to permit the welding operator to correct position of the rails without any impact.

2.9 Rail Alignment & Twist Correction:

Flash Butt Welding Machine should be equipped with automatic rail ends alignment facility. Rail alignment (lateral and vertical) and de-twist facility should be incorporated in the fixed and moving heads of the machine for execution of the weld in perfect geometric alignment fully automatically over a length of 1 m. There should be no need of any manual adjustment while welding the new rails. Arrangement through sensors which reads and records maximum mismatch in alignment between gauge faces should be provided. Automatic selection of gauge face should be possible. The aligning force and detwisting force shall be sufficient for maximum rail section to be welded. Visual display should be available for correct alignment. Automatic rail alignment setup should be capable to perform alignment as per stipulations of Manual for Flash Butt Welding of Rails-2012.

There should be provision of manual adjustment in case cross section of two rail ends being welded have major mismatch for welding of released rails.

Adequate lighting arrangement should be available inside the machine to enable visual check of alignment and matching of rail ends.

2.10 Automatic Stripping Unit:

The welding unit should have a trimming arrangement as an integral part of the unit so that it can trim the excess upset immediately after welding. The action of stripping should be controlled completely by the welder automatic sequence panel. The trimmer should have the capability to trim excess hot upset metal all round the rail section in such a way that minimum grinding is required to achieve final finished profile at weld as prescribed in FBW Manual. The maximum thickness of trimmed surface shall be in accordance with provisions of item (v) of Part 'A' & 'B' of Annexure-IV of FBW Manual.

Suitable trimming dies should be provided for the rail sections to be welded. Sufficient force shall be available for stripper for upset removal from any rail section/ Metallurgy which the machine is capable of welding.

There should be a well designed weld chips collection trolley which shall be capable to dispose the burn chips away from trench of welding machine.

2.11 Hydraulic Power Pack:

The machine shall have a Hydraulic power packs consisting of suitable units for the servo valve system and other requirements of the welding machine.

The servo system should be sensitive to contamination, isolated and maintained with greater care. The unit should include oil reservoir, oil cooler, motor pump assemblies, associated filters, gauges, sensors, pressure relief valves, etc. for protection and long life of the hydraulic system. The equipment should be capable of operation at an ambient temperature up to 55⁰ C. On board system for filtration and monitoring the quality of hydraulic oil in hydraulic circuit should be provided. The gauge should clearly indicate that the hydraulic oil is contaminated beyond the permissible limits and requires immediate replacement.

The Hydraulic oil used shall be of commercially available specification.

The manifolds of valve system should preferably be placed and fixed outside the machine frame to avoid damage due to constant vibration and should be placed at convenient height. The hydraulic parts should be of renowned brand and its spare parts and service facilities should be available in India.

A separate filtering unit to be provided for hydraulic oil used in circuits before it enters hydraulic oil cooling system.

2.12 Electrical power Pack:

The Electrical equipments should be fully tropicalized. The equipment should suit connection to 400/440 volts 3 phase 50 cycle (HZ) supply. The machine shall be capable of adjusting/withstanding to a voltage fluctuation up to +10% while in operation. A voltage stabilizer of 440 volt shall be provided in mains supply of welding machine to minimize the voltage fluctuation and provide appropriate voltage to mains of electrical power pack.

The welding process will be based on Direct Current for a uniform and fast heat accumulation in the work piece. The three phase mains connection shall have a uniform power load possible and has a power factor better than 0.85.

The secondary circuits of the transformers should be cooled to prevent over-heating. A wide range of secondary voltages should be available to allow for the correct heating conditions to be selected for individual rail sizes.

The energy consumption per weld in KWH should be indicated for different rail sections.

The manufacturer needs to stipulate the specifications of the transformers required for functioning of FBW plant.

2.13 Centralized Lubrication:

Automatic Lubrication is to be provided for the machine. The frequency of lubrication shall be programmable.

2.14 Cooling System of Machine:

The cooling system shall be efficient and designed for maximum ambient temperature of 55°C. Supplier may note that the machine shall be working under extreme dusty conditions and the cooling mechanism should be maintainable under these conditions for all prime movers. Adequate heat transfer arrangement for the hydraulic system shall be designed and provided so that under extreme heat conditions, the temperature of system oil does not go beyond limit recommended by Oil Company.

The installation of requisite device/system for temperature control of machine/welding electrodes will be part of this item.

3.0 Programmable Logic Control (PLC):

Flash Butt Welding of rails involves accurate and dependable control of current of the order of 70,000 Amps. PLC, AD/DA conversions, sensor-actuator links etc. enables accurate performance. The bidder should specify the details of PLC incorporating with the machine.

The PLC Software listing shall be issued in the form of a Ladder Diagram along with the Operating Manual.

4.0 Computer based Weld Data Recording and Monitoring Equipment:

This equipment should be capable of being wired/ connected directly to the FBW machine and give an immediate read out which in comparison with pre-fed master data should automatically identify any inconsistency in welding machine operation. Automatic microprocessors weld control recorder should be provided to record data pertaining to each weld such as voltage, current, upset pressure and total welding time and temperature of cooling water and servo oil. It should be of the digital print out type in which the various values are printed in one colour (say blue) when they are within limits. Otherwise these are printed in other colour (say red). For every red print there should be a small audible beep. The weld data recorder must be capable for online monitoring of weld sequence and quality of weld joints. The recording system should be a computer based data acquisition system specifically designed to record entire weld process in detail for complete weld process analysis. The data logger will have a minimum capacity to store one lakh welds data for retrieval and study.

In order to minimize intervention to alter standardized input parameters, the software should have the facility of password protection for modification of these parameters.

The hardware consists of a single processing unit, a processor unit (PC type) with hard memory, disk drive, a touch screen video display unit and Keyboard. The second remote monitoring unit will consist of a basic computer with laser/ink jet printer.

The weld parameters sensed and operated upon by the machine control are to be communicated to the recorder through a suitable communication port. All these signals are to be recorded in coded form in the memory in the recorder for further retrieval, if desired.

Parameters to be recorded for each weld:

- Date & time of welding
- Joint serial number
- Section and UTS of the rail
- Pre weld alignment
- Welding current (Primary, amps)
- Line voltage in Volts
- Primary voltage (Volts)
- Clamping pressure Kg/cm²
- Butting pressure Kg/cm²
- Number of Pre-Heats
- Pre Heat time On - Off in sec.
- Burn off time in sec.
- Flashing time in sec.
- Total stroke in mm.
- Butting stroke in mm.
- Total time in sec.
- Upset length i.e. rail consumed per weld (mm)
- Heat soak back duration
- Post heat delay
- Post Heat ON Time
- Post Heat OFF Time
- Number of post Heats
- Duration of Butting

- Slippage of Rail (Yes or No)
- Weld Analysis (GOOD or BAD)

The system offered should be capable of building upto 99 sets of parameters.

The supplier shall describe the elements employed in the system with the details of the manufacturer. It should be ensured that consumable spares and repair facilities of the system are available in India.

It should be possible to locate the system in a separate room situated upto 40 meters away from the welding machine.

The system shall be compatible with other machines supplied with plant for automatic feeding and maintaining the data base of complete weld from Pre-straightening to final finishing phase.

5.0 Smoke Trapping Device/ Fume Extraction Equipment:

All smoke and spark material shall be trapped by device and deposited in the receptacle.

Fumes and dust must be sucked out from the welding chamber and passes through a cyclone separator and exhausted to the atmosphere through a chimney of suitable height. The particulate matter must be collected in a bin at the bottom of the separator. The bin shall have adequate capacity for atleast day's production to avoid frequent removal. It must ensure that there is no discomfort to operator due to welding fumes and dust and operator is fully protected from the spatter.

The cyclone separator should be mounted outside the shed which houses the flash butt welder. Only the suction ducting should be brought in and connected through suitable flexible ducting to permit the machine traverse for rail panel positioning.

The motor control should be mounted inside the shed for easy access to the flash butt welding operator. The fume extractor should be interlocked with the Flash butt welder to ensure that it is in operation before welding commences.

6.0 Automatic Cooling Device:

Adequate cooling arrangements (Air/water/liquid) for cooling of welded rails to normal temperature should be provided at such suitable distance from the welding machine where temperature of the weld is not more than 350⁰ C. The cooling arrangement for all rail sections and rail steel should be quick enough so as not to reduce the capacity of plant i.e. 20 joints per hour. The arrangement shall be specified by the bidder.

7.0 Post Weld Heat Treatment:

Alloy steel rails and heat treated/head hardened rails need post weld heat treatment to ensure variation in hardness within acceptable limits in heat affected zone. Suitable equipment should be provided for post heat treatment facilities with necessary control features. This device among other thing shall enable the post

heating sequence being set to pre-determine temperature and cooling time with a selector switch to bring in the automatic post heat cycle whenever required. The facility should preferably be in-built with the welding machine.

The facilities, if proposed to be provided separately on the welding line at the adjustable distance from the machine, should have proper interlock with main welding machine to be incorporated in welding cycle.

8.0 Stand by Diesel Generator:

8.1 A suitable diesel operated generating set with adequate capacity to feed welding transformer, compressor, electric hoists, Goliath crane and motorized line etc. to be supplied with the welding plant as standby for welding operation. The basis for deciding capacity should be clearly brought out in the offer.

The generator shall be powered by indigenous diesel engine and shall have proven record of service in tropical conditions. The detailed technical literature and specifications along with manufacturer's literature should accompany the offer.

8.2 The engine should have Electronic Control Module (ECM) or similar arrangement for taking out operating parameters on real time basis such as RPM, load, temperature, pressure and diagnostic data as well as trip and historical data. These data should be displayed and stored on a centralized computer and monitoring system. It should also be possible to transfer these data on USB device through the centralized computer based control.

8.3 In order to adhere to pollution control norms, the diesel engine should be electronically controlled emissionized engine with minimum compliance of tier 2 stage.

8.4 The engine should be enclosed in a weather protective, sound and dust resistant enclosure to minimize engine noise and to prevent oozing out of oil spills etc. from engine area to the adjacent components like alternator, hoses, electrical cables, fittings as a protection against fire. All doors on the enclosure shall be strategically located in areas as to allow ease of maintenance of the engine and allow good access to and visibility of instruments, controls, engine gauges, etc. Sufficient louvers shall be provided to allow the total engine cooling air requirements used in this application.

9.0 Automatic Rail End Brushing Machine:

9.1 Brushing Machine shall be so designed that it will automatically clean the specified area of rail along with dust evacuation before welding in order to establish uniform contact on running surface. The machine shall be capable to remove the scale, rust and other grit from the rails using steel wire brushes. The brushing process should ensure optimal contact resistance between the rails and the welding electrodes. The operation shall meet the provisions of the Manual for flash butt welding of rails-2012 issued by RDSO.

Suction and dust collection system shall be available in machine. It should be provided with a powerful dust exhausting system.

- 9.2 **Clamping Unit :** Clamping units shall be provided for centering of the rails while brushing. The system preferably to be hydraulically operated for the movements of the brushing units and electric motors for continuous control torque for the brushing, thus ensuring efficient cleaning of the rails.
- 9.3 **The area to be cleaned:** The rails end faces and the adjoining surface of the rail profile to a width of about 25mm all round and electrode contact locations of rails.
- 9.4 **Operation:** The operation should be automatic and sensors are to be provided to detect rail ends and position them inside the machine. Once rail end is positioned, the brushing cycle to be executed by the pre-programmed logic control sequence. The cleaning shall be accomplished within the weld cycle time, so that productivity of plant is not adversely affected.
- 9.5 **Safety:** The machine will be equipped with all safety features commensurate with good engineering practice and industrial standards as expected. The machine should disable and indicate in case of system failure. Fail safe interlocks should be provided to prevent faulty operation. The supplier should indicate the safety features provided in the machine.

10.0 Weld Grinding Machine:

The machine should be capable of running on 440V 3 phase AC Electrical supply. The machine shall be so designed as to complete the grinding operation on all sides of the rail in not more than 5 minutes.

In order to maximize the output of the welding plant as a whole, more than one automatic grinding machine may be planned in the same welding line or an alternative line, as per layout of the plant.

The machine should have powered movement on its own wheels for positioning and use large high speed grinding wheels. The grinding operation shall be automatic. The weld finish tolerance on rail profile as specified in the FBW Manual should be achieved after grinding.

It shall be ensured that indigenously available grinding stones can be used on this machine.

Machine should have PLC control, dust exhausting system, internal laser measuring and recording system.

11.0 Rail Straightening Machine (Pre and Post Weld):

- 11.1 The Pre Straightening machine is required to correct rail end of rails to be welded and this machine shall be stationary with suitable inching movement for placement of rails in the press. The Post Straightening machine is required to correct the weld alignment and this machine should be self propelled to adjust itself to correct weld location without affecting the welding line. Both the machines should be capable of

correcting both vertical and lateral alignment for all the rail sections to be welded i.e. rails upto 68 kg/m.

- 11.2 The post straightening machine should be capable of removing the bad alignment in the welded flash butt joints and should suit various rail sections. The machine should provide alignment correction in vertical and lateral direction and should have powered travelling arrangement for adjusting to different lengths of rails being welded. The machine should have misalignment measuring device and also visual indicator to point out the location and extent of misalignment. The alignment correction supports should be moveable so as to handle short and long kinks.
- 11.3 The pre-straightening press should be provided as a stationary press. A straightness measuring device should be provided to measure and record the straightness of the rail.
- 11.4 The frame of presses must be of robust design. Adequate stiffeners and gusseting is to be provided for structural strength. All welded structures must be suitably stress relieved by heat treatment. The horizontal and vertical cylinders should not be integral with the main machine body to facilitate maintenance of the cylinders as modular units.
- 11.5 The laser measurement system should measure the straightness of the welded joint and display it in a graphical form and data should be stored in the tabular form. The laser measurement device must measure the head of the rail on the three surfaces, namely; top side, front gauge face and rear gauge face.
- The measurement should be done with the help of laser displacement sensor and the final straightness data should be stored in memory for later retrieval and analysis. If the rail is within the acceptable tolerance band the operation is complete or else the operator will have to repeat the cycle till the required straightness is achieved.
- 11.6 The Rail Straightening Machines should have a control system with PLC, key board and other required devices. It should also have software to visualize the straightness of the rails, force supplied on the rails, the deformation process induced by straightening force and shall be displayed on the screen. The final alignment achieved shall automatically get recorded and stored for further analysis. This should be compatible with weld data recorder so that the data of press is fed to recorder for comprehensive record.
- 11.7 The design shall be such that the manual verification of alignment is easily possible and area is well illuminated. The control panel should have provision for emergency stop for emergency and interlock to stop machine if deflection beyond pre-specified limit is exceeded to prevent breakage of rail.

12.0 Maintenance Spares:

- 12.1 The tenderers are required to furnish a detailed list of essential spare parts along with detailed drawings and specifications/metallurgical specifications required for

operation of entire plant for a period of two years. These spares should be included with the price of each equipment.

12.2 It should be necessary for the tenderer to indicate as to which of the parts listed can be procured indigenously and identifying the remaining items which are required to be necessarily imported.

12.3 The tenderer should provide the itemized list of spare parts giving full particulars of the parts indicating part number, description, name of manufacturer, unit price, recommended quantity etc. The sketches/ drawings wherever required should also be furnished.

13.0 Consumable Stores:

The tenderer should furnish detailed specification of all consumable stores except fuel required for the smooth running and operation of all the machinery & plants offered under the contract, clearly indentifying whether all such items are indigenously available or any item is required to be imported on continuing basis. The unit price and quantity of all such items should be quoted. The consumable stores except fuel for a period of two years should be included in the tendered offer for the welding plant.

14.0 Installation of Plant:

14.1 The installation of the plant should be undertaken by the manufacturers of the plant or their agents in India, who should commission the same. The services of firm's engineers should be made available to install and operate the same for at least two months. Railway staff will also be trained by the supplier of the plant for 02 months in regular operation of the plant, as part of the contract.

14.2 The installation includes the making foundation for machines as per requirement and design finalized by manufacturer or his authorized agent in India, supply and providing all the installation materials like bolts and nuts, brackets etc complete in all respect. Special tools required for installation/maintenance shall be provided by the tenderer.

15.0 Training of Staff:

15.1 Two persons from the Railway will be trained, as part of this contract for a period of one month each in manufacturer's country or any other country where similar machines are working. The cost of training includes lodging, boarding, air fare etc. and training material shall be borne by the tenderer.

15.2 In addition to above, the operating staff will be trained for day to day operation and maintenance during the two months period the plant is under operation of the supplier.

15.3 The audio visual material like films, videos, slides etc. will also be made available by the suppliers which may facilitate general training of the staff.

16.0 Layout:

- 16.1 The tenderer should furnish the overall layout of their proposed plant together with sketches or drawing pertaining to the same to appreciate the inter-se- position of various units and infrastructural requirements to be provided by the Railways. The location of the plant vis-à-vis essential accessories is to be furnished in the form of block diagram.
- 16.2 The proposed layout shall consider the existing facilities available in the existing plants. It is desirable that tenderer visits the plant to have details of existing layout themselves. The overall dimensions of the layout including length, breath, height and structure/shed required for accommodating the equipment, specification of essential elements etc. should be indicated.

17.0 Instruction Manuals:

All manuals (installation, operation and service) shall be supplied in English. Detailed installation documents complete with typical layout, list of special tools and accessories etc. should be supplied in six sets, well in time to enable coordination with order to installation activities. Equipment description including installation, testing, schematic wiring, physical location, drawings, etc. shall be supplied.

18.0 Inspection of the Equipments/ Welding Plant:

- 18.1 All the equipment will be tested before dispatch by the technical inspection officers of Indian Embassy or authorized representative of Indian Railways. While inspecting the machine before dispatch from the supplier's premises, the inspecting officer shall verify the conformity of the machine with respect to individual specification as above. The machine's conformity/non-conformity issue in respect to each item shall be jointly recorded before issue of the inspection certificate and approval for dispatch of the machine as per Annexure –I enclosed.
- 18.2 The following documents shall be provided to the Inspecting Officer at least 4 weeks in advance of the date of inspection.
- i) One copy of complete technical literature of machines/tools/equipments including installation, operation and service manuals/instructions and complete electrical & hydraulic, trouble shooting charts, component drawings/ description and other relevant technical details as a reference documents in soft & hard copies in English language.
 - ii) Clause by clause comments of the manufacturer to be sent to Inspecting Officer (IO) in advance for his review. Comments should state manufacturer's conformity of compliance of each of the requirement stated in each clause, elaborating where necessary the details/manner in which the requirement has been complied. The proforma for the clause-wise comments is given below:

Clause no.	Clause	Comments of manufacturer	Comments of Inspecting Officer

- iii) Manufacturer's Internal Quality Inspection Report of the machine.
- iv) Manufacturer's quality certificate and/or test reports for bought out assemblies/sub-assemblies to be provided to IO, containing serial number wherever applicable.
- v) Draft Inspection Report to be prepared by the manufacturer, containing all Annexure mentioned at clause 18.3

18.3 List of documents to be annexed in the draft Inspection Report should include:

- i. Maker's Test Certificate.
- ii. Manufacturer's Internal Quality Inspection Report
- iii. Quality Certificates of Bought out assemblies/sub-assemblies
- iv. List of spare parts to be dispatched along with the machine
- v. List of tools to be dispatched along with the machine
- vi. List of Manuals, Drawings, Spare Parts Catalogues, etc. to be dispatched along with the machine, duly indicating the number of sets of each.

19.0 Additional Information:

19.1 Names and address of the administration to which the equipment quoted has already been supplied by the tenderer should also be indicated.

19.2 The supply of drawing will in no way absolve the tenderer of his responsibilities of supplying the equipments strictly according to the specifications.

19.3 Four copies of test and inspection certificates for each equipment should be supplied along with the equipment.

19.4 Any updation of plant with the upgradation of technology or as per requirement of railway in future upto 10 years which is possible with minor alteration/addition etc should be acceptable to OEM through agency. Most of the upgradation would be based on changes/modification in software of control panels of machine(s) in this regard.

20.0 Equipment Environment:

20.1 Equipment shall be capable of continuous operation during the varying atmospheric and climatic conditions prevailing throughout the year in India. The range of climatic conditions is as follows: -

- a. Ambient temperature : -10° to 55° C
- b. Altitude: : Sea level to 1800 m above mean sea level

- c. Humidity: : 40% to 100%
- d. Rail temperature : (-) 10° C to (+) 75° C

20.2 The entire equipment should be thoroughly tropicalised for working in Indian conditions.

20.3 All the machines including generators should be environment friendly.

Various parameters regarding sound and air pollution should be provided by manufacturer with machine so that the same may be addressed rightly in case the plants are situated at built up area.

21.0 Warranty Clause:

In addition to the special conditions of contract dealing with warranty, the following will apply:

Should any design modification be made in any part of the equipment offered, the period of Warranty (24 months) would commence from the date the modified part is commissioned in service for the purpose of that part and those parts which may get damaged due to defects in the new replaced part, the cost of such modification should be borne by the supplier.

22.0 Annual Maintenance Contract (AMC):

22.1 The Plant and connected machines will be required to be maintained for a period of Five (5) years after the expiry of warranty period.

22.2 For above, tenderers are required compulsorily to quote for comprehensive annual maintenance contract per year for all machines for a period of 5 years. The duration of AMC shall be of five years from the date of expiry of the warranty. The AMC will be inclusive of preventive maintenance services, supply of all spares, maintenance material required and labour cost. All consumables except fuel, lubricating oils, hydraulic oil, toolings, drills and tapes shall form part of the scope of comprehensive AMC.

22.3 Technical audit for every 20000 joints by OEM or his authorized representative during AMC period shall be part of AMC.

INSPECTION CERTIFICATE

Certificate of Inspection of..... (Model No.....) by Inspecting Official and Approval for dispatch of Machine.

(Strike out whichever not applicable)

This is to certify that I have inspected the bearing SI. No.from (date).....toat (place).....for its conformity / non –conformity with respect to the laid down Technical Specification on contract agreement No.....dated.....between the President of India through and M/s. (Name of Contractor)

The detailed inspection note regarding its conformity / non conformity to the laid down specification is enclosed along with Annexure ‘A”. It is observed that:

(Strike out whichever is not applicable)

- Theconforms to all the laid down Specifications.
- The conforms to all the laid down Specifications except those at SI.No.....
- The above deviations are minor / major affecting / not affecting the performance of the equipment/machine in substantial way.

The following T & P, manuals, drawings are to be supplied along with the machine.

- 1.....
- 2.....
- 3.....

Based on the above theis certified/not certified to be conforming to the specifications.

The is approved/ not approved for dispatch to(consignee) Indian Railway.

SIGNATURE AND DATE

For M/s
(NAME AND DESIGNATION)
.....
.....

INSPECTING OFFICIAL

for and on Behalf of President of India