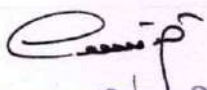


Tender No _____

Section V

Hydraulic Press to Specification No.CR / IR / HP-300T/200T/2025.

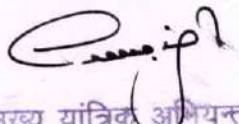
SN	Content	Page no.
1	Abbreviations	2
2	Basic Design features	3
3	General Electrical Specification	9
4	General Characteristics	12
5	Technical Literature	17
6	Spares	18
7	Consumables	18
8	Special Features	18
9	Deviations	18
10	Inspection & Testing at Manufacturer' Works	18
11	Training	19
12	Foundation & Related drawings	20
13	Installation, Commissioning & Proving Test	22
14	Service facility in India & Technical Support	24
15	Bought Out Items	24
16	Colour	25
17	Warranty Obligation	25
18	Comprehensive Annual Maintenance Contract	27


उप मुख्य यांत्रिक अभियन्ता
मध्य रेल, माटुंगा
Dy. Chief Mechanical Engineer
Central Railway Matunga

1

ABBREVIATIONS

A-1,A-2, A-3, A-4	Standard paper sizes
AC	Alternating Current
AMC	Annual Maintenance Contract
AT	Acceptance of Tender
BG	Bank Guarantee
PCME	Principal Chief Mechanical Engineer
CNC	Computer Numeric Control
CR	Central Railway
PCMM	Principal Chief Material Manager
PFA	Principal Finance Advisor
Db	Decibel
DC	Direct Current
FA&CAO	Financial Advisor & Chief Accounts Officer
Sr.DFM	Senior Divisional Finance Manager
Dy.FA& CAO	Deputy Financial Advisor & Chief Accounts Officer
WAO	Workshop Accounts Officer
GA (Drawing)	General Arrangement (Drawing)
HRC	Hardness Rockwell 'C' Scale (value)
Hz	Hertz
IEC-Pub	International Electro technical Commission – Publication
JCN	Joint Commissioning Note
JRI	Joint Receipt Inspection
kW	Kilo Watt
LC	Letter of Credit
LD	Liquidated Damages
LOA	Letter of Acceptance
NC	Numeric Control
NIT	Notice Inviting Tenders
PBG	Performance Bank Guarantee
PDF	Portable Document Format
PLC	Programmable Logic Controller
PTC	Proving Test Certificate
PU	Production Unit (Any of the six Railway Production Units e.g. RCF, ICF etc.)
RDSO	Research Design & Standards Organisation
SS	Solid state/ Stainless steel
WBG	Warranty Bank Guarantee


उप मुख्य यांत्रिक अभियन्ता
मध्य रेल, मटुंगा
Dy. Chief Mechanical Engineer
Central Railway Matunga

Technical Specification No.: CR / IR / HP-300T/200T/2025

1. **Basic Design Features:**

1.1 **Safety features:**

- 1.1.1 The machine shall be suitably protected by necessary safety features against any accidental operation, overload, power fluctuations, power failure etc. Suitable interlocks, alarms and warning lights must be provided.
- 1.1.2 The press and its accessories must ensure safety of the operator and the system at all times. **Details of the safety features shall be furnished in the bid.**
- 1.1.3 Emergency stop push buttons shall be provided at convenient locations to switch off the machine in case of emergency.
- 1.1.4 Clearly visible indication lamp showing status of working of press to be provided near the machine, for all the workers to see, who are working near the machine.

1.2 **Specific characteristics shall be as indicated below:**

A. **"C-Frame" Down-Stroking Type Hydraulic Press**

The leading parameters for "C-Frame" down-stroking type hydraulic press have been indicated in **Schedule-1A & 1B**

1.1 **Press Frame**

- 1.1.1 The press frame shall be a weld fabricated structure using IS 2062 (latest) Grade E-250 BR plates and by welding them as per standard welding procedures designed to withstand a force of 1.5 times the normal developed force. The plates should be as per BIS specifications & Material Test Certificate (MTC) of the plates issued by steel plant should be submitted to inspecting officials. All welds shall be checked for weld defects. **The method of checking weld defects and the method of stress relieving shall be explained in the bid.** The records of stress relieving should be furnished during the inspection of the machine. **The detailed design calculations for the suitability of the critical sections or the FEM analysis should be furnished in the bid.** The design of the press frame shall be such that there is minimum deflection in the press frame under full load. **Value of deflection at full rated capacity shall be indicated in the bid along with calculations.** A cross-sectional drawing shall be submitted clearly showing the various stiffeners provided for structural strength

1.2 **Working Table**

- i) The weld fabricated, stress relieved and accurately machined working table shall be of robust design to withstand full working load. Press shall accommodate tool bolster for which 4 nos. T-slots shall be provided. Extra ribbing shall be provided to avoid any deflection during operation.

उप मुख्य यांत्रिक अभियंता

मध्य रेल, मटुंगा

Dy. Chief Mechanical Engineer

- ii) The head face and all sliding surfaces should be ground smooth. All moving surface should be blue machined to 0.3 micron or better. The table and ram block should be also machined to 0.3 micron or better.
- iii) The ram end shall carry ram block ram block/moving platen/ slide forged out of highly wear resistant alloy steel and tenderers shall indicate the material to be used. The ram block/bottom plate of slide shall be provided with T-slot as per IS-2013 as approved in GA drawings by consignee. **The method of coupling the moving platen to the ram end shall be explained with the help of drawings in the offer**

B. For "Four column" down-stroking type hydraulic press:

- 1.1 The leading parameters for the "Four column" down-stroking type hydraulic press have been indicated in **Schedule-1C**. The design of press shall be such that it shall be possible to have 100% load upto $L/15$ from the centre line or 25% load at $4L/15$ from the centre line where L is the front to back or left to right dimension between the columns, to resist eccentric loading while pressing. Other specific characteristics shall be as indicated below.

1.1.1 Fixed Crown Head

The fixed crown shall be a sturdy, rigid and robust fabricated structure, duly stress relieved. The hydraulic power pack shall be mounted on the fixed crown to minimize space requirement and piping length. Sufficient space along with safety railings should be provided around the periphery of crown for maintenance activity on the crown.

1.1.2 Moving Head

The moving head shall be a rigid, fabricated structure duly stress relieved, with arrangement for fitment of ram on top. T slots shall be provided on the ram for fitment of die bolster. Suitable liners shall be provided on the columns for guiding the smooth movement of the head without stick slip effects. Material specification and surface finish of the liners shall be indicated in the bid.

1.1.3 Bottom Head

The bottom head shall be provided with T slots for fitment of bottom dies. Both faces of the moving (top) and bottom (fixed) heads shall be horizontal and parallel to each other. The faces and all sliding surfaces shall be ground smooth

1.1.4 Tie rods

The columns shall be fabricated structures from heavy duty steel plates and fixed between top and bottom heads. The tie rods shall be pressed through the columns for holding top and bottom heads together rigidly. The tie rods shall be machined from forged steel, ultrasonically tested, hard chrome plated and ground. The rods shall be pre-stressed to 150% of the normal developed stress at the full rated capacity. Material specification of the tie rods shall be indicated in the bid.

B. Common to all Schedules:

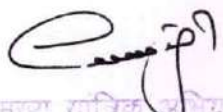
1.1 Ram-Cylinder Assembly

- 1.1.1 The press shall have one fixed main cylinder. The cylinder shall be machined from **Medium** carbon steel forgings, accurately bored/machined and honed to 0.3 microns or better. The Design philosophy of Main Ram & parameter selected such as material, type of construction & wall thickness etc should be explained in the bid. **Relevant certificates of the cylinder shall be provided**

उप मुख्य यंत्रिक अभियंता
मध्य रेल, मटुंगा
Dy. Chief Mechanical Engineer
Central Railway Matunga

during Inspection. Ultrasonic Testing of complete cylinder shall be done in presence of Inspection authority in case cylinder is supplied by Indian Manufacturer.

- 1.1.2 The cylinder shall be of double acting with proper rear guiding arrangement for the ram. The piston cylinder assembly shall be effectively pressure sealed at both ends to prevent oil leakage and metal to metal contact between the piston and cylinder. The cylinder gland packing shall be designed for almost dry rod operation. **Arrangement provided for relieving the piston seals of any lateral loading shall be explained in the bid. The offer shall explain the sealing arrangement provided in the ram-cylinder-assembly with the help of a labeled sectional drawing.**
- 1.1.3 Hydraulic seals, 'O' rings and packing under compression shall have high compressive performance and shall be made from material such as nitrile rubber/neoprene/Teflon/PTFE. **The average life of the proposed material shall be indicated in the offer.**
- 1.1.4 The piston head shall carry non-metallic piston seals, slide rings and gland packing liners of suitable material such as Teflon-Turcon/ bronze impregnated PTFE, to avoid metal to metal contact between cylinder and piston assembly. Adequate number of sealing and rider rings shall be provided on the piston head and gland packings to ensure pressure sealing.
- 1.1.5 The surface hardness of RAM cylinder shall be HRC-60 or better. Thickness of chrome plating shall not be less than 20 microns. These shall be ultrasonically tested for cracks. **Material specification, actual hardness, surface finish and thickness of chrome plating of the ram cylinder shall be indicated in the bid. Test report for as stated above shall be provided during inspection.**
- 1.1.6 The ram shall be able to generate an effective force of rated capacity. **The design calculations, taking into consideration frictional losses in the hydraulic circuit as well as in the ram-cylinder assemblies shall be explained in the offer.** The bidder shall submit dimensioned assembly drawings showing cylinder bore and ram/ram head dimensions (with tolerances). **Design calculation for motor horse power, speed, pump capacity and motor power shall also be explained in the offer.**
- 1.1.7 The ram end shall carry ram block/moving platen forged out of highly wear resistant alloy steel, and tenderers shall indicate the material to be used. The ram block shall be provided with T-slots as per IS-2013 as approved in GA drawings by consignee. **The method of coupling the moving platen to the ram end shall be explained with the help of drawings in the offer.** 1.1.8 The ram-cylinder assemblies shall be provided with suitable arrangement such as slide rods to prevent ram rotation during ram working. **The arrangement shall be explained in the offer.**
- 1.2 **Hydraulic System**
- 1.2.1 The hydraulic system shall be of modular construction (with logic control valves/ solenoid valves), The drive of the press shall be through hydraulic pumps. **Details of which shall be given in the offer.**
- 1.2.2 The hydraulic power pack unit shall be available on the floor level for easy accessibility for maintenance. It shall be mounted on suitable anti-vibration mountings. The tank of hydraulic system shall be as per the latest applicable


उप मुख्य यंत्रिक अभियन्ता
भारत रेल, मटुंगा
Dy. Chief Mechanical Engineer

standard. It shall be provided with an air breather(s), suitable baffle plates, filler breather, temperature indicator gauge, inspection cover(s), provisions for addition of lines in future, over flow and drainage connections.

The design of tank should be such that no oil should spill on the floor. Suitable mechanism for collection of Oil around the wall of Tank should be provided by means of Oil tray etc. Suitable Expansion joints should be used in high pressure lines to avoid transmission of vibrations to other systems.

The tenderer shall indicate the location of hydraulic power pack in the overall press layout drawings. The location shall be such as not to infringe the machine operation and material handling. **Accuracy of pressure for main ram shall be within $\pm 1\%$ of full scale display.**

Note However, if any consignee desires to have hydraulic power pack mounted on the fixed crown he may decide so and indicate his preference for same at the time of approval of General lay out diagram as per **clause 11 of Section V** and successful bidder has to agree for the same.

1.2.3 The hydraulic fluids used shall be non-corrosive, stable and safe. It shall be available indigenously in India. **Particulars of the hydraulic fluid used shall be indicated in the offer. The successful bidder shall be required to indicate reputed Indian source of supply for the hydraulic fluid.** The first fill of the hydraulic fluid shall form a part of the supply as concomitant accessory.

1.2.4 The hydraulic system shall be sealed for protection against contamination.

1.2.5 Adequate number of filters (for full capacity of pressurized oil) shall be placed in between the circuit and the pump, having filtering capacity of 25 microns or better. The filters shall be replaceable type. The type, make and model no. of each filter element shall be clearly indicated in the offer. A return line filter of 25 microns or better shall be provided. **The type, make and model no. of each filter element shall be indicated in the bid.**

There should be interlocked alarm in PLC when the filters are clogged and machine should not work to avoid damage to other critical hydraulic parts such as pumps/valves etc.

1.2.6 The filtering system shall be provided with a by-pass valve which shall operate in case of clogged filters. The filters shall have a clogging indicator. **Details of the clogging indicator shall be furnished in the bid.**

1.2.7 A temperature sensor shall be provided to indicate hydraulic oil temperature on the control panel. The temperature of oil in hydraulic circuit shall not exceed 60°C in any case. The press shall stop functioning if oil temperature exceeds nearly 60°C and interlocking of same should be provided in press controls. A suitable cooling system complete with air-cooled heat exchanger and all accessories shall be provided to ensure that oil is not overheated under local weather conditions at continuous normal working of the machine. **Arrangement shall be explained in the bid. Heat load calculations and the details of heat exchanger system should be furnished.**

1.2.8 Oil level sight gauge, or any other equipment showing maximum and minimum oil levels, shall be provided on the oil tank.

1.2.9 A suitable system shall be incorporated in the press to indicate low oil level in hydraulic oil tank and the press shall stop in case of low oil level with audio and

6


उप मुख्य यांत्रिक अभियन्ता
मध्य रेल, मटुंगा
Dy. Chief Mechanical Engineer
Central Railway Matunga

visual warning. **The Hydraulic Pipe joints should be TIG welded with all joints RT tested to ensure no failure of same during operation at site over the life of machine.**

1.2.10 A drain plug at the lowest portion of the tank shall be provided so that oil can be drained out without disconnecting any pipe or pipe connection.

1.2.11 Cold drawn seamless steel pipes capable of withstanding high hydraulic pressure **(150% of the maximum hydraulic pressure)** conforming to DIN 2391/C shall be used in the hydraulic circuit. Pipe fittings shall be Ermeto type, vibration proof. The steel tubes shall be suitably coated for corrosion prevention. **The arrangement provided shall be explained in the offer.**

The Hydraulic Pipe joints should be TIG welded with all joints RT tested to ensure no failure of same during operation at site over the life of machine.

1.2.12 The successful tenderer shall provide the first filling of hydraulic oil, the cost of which shall form part of the basic price of the press. **Tenderers shall indicate the exact grade of oil used and equivalent oils available in India that are suitable for use.**

1.2.13 The tenderer shall submit with the offer a diagram of the hydraulic circuit incorporated in the press giving full details such as size of lines, cut-off pressure, type, model number and make of:

i. hydraulic elements

ii. hydraulic motor

iii. pumps, etc.

The logic diagram for sequence of operations must be supplied. Each element in the diagram shall be suitably numbered. The elements on the press shall be correspondingly labeled prominently for the convenience of the operating and maintenance staff. "The machine hydraulics should be as per IS/DIN standard. **The relevant standard used as reference shall be indicated in the bid.**" **All hydraulic pipeline actual routing diagrams to be furnished along with hydraulic circuit.**

1.2.14 The working pressure of the hydraulic shall not exceed 250 kg/sq.cm. The system, along with all the hydraulic elements, shall be designed to withstand a pressure of 1.5 times the working pressure.

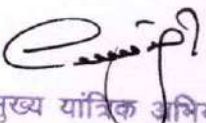
1.2.15 It shall be possible to limit the pressure through relief valves.

1.2.16 The hydraulic system shall be provided with double safety pressure relief valves. The first setting shall be at the maximum working pressure, while the second setting shall be at a pressure 4 to 5% higher than the maximum working pressure. In the eventuality of failure of the first system, the second system shall take over immediately, disconnect the pump output to the cylinder and allow discharge to the hydraulic tank. **The system so designed shall be explained in the offer with a line diagram of the hydraulic circuit. The names of individual hydraulic element shall be indicated in the bid.**

1.2.17 The hydraulic circuit shall be designed for minimum wastage of energy and shall not generate avoidable heat. **The offer shall clearly explain how this efficiency would be achieved.**

1.2.18 The valves in the circuit shall be matched for adequate capacity to ensure a smooth flow.

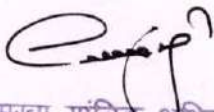
1.2.19 To avoid damage, there shall not be any pressure build-up at any time in the drain line or in the drain ports of hydraulic elements.


उप मुख्य यांत्रिक अभियन्ता
मध्य रेल, मटुंगा
Dy. Chief Mechanical Engineer
Central Railway, Matunga

- 1.2.20 Restrictions in the pressure line shall be avoided.
- 1.2.21 The ram speeds shall be adjustable and the control shall have a graduated scale to indicate ram speed in mm/min. **The ram displacement will be through LVDT (Linear variable differential transducer) and displayed in PLC - MMI. Arrangement provided shall be explained in the bid.**
- 1.2.22 Decompression arrangement shall be provided to release pressure on top position and prevent downward creep. **The device shall be explained in the offer.**
- 1.2.23 A safety device shall be provided to retain the moving head in the top position and prevent downward creep. **The device shall be explained in the bid.**
- 1.2.24 Turbulence in the tank shall be minimized by providing suitable baffle plates. The offer shall explain how this will be done.
- 1.2.25 Suitable breathers and strainers of adequate capacity shall be provided in the tank to avoid cavitation.
- 1.2.26 A safety catcher arrangement shall be provided to retain or hold moving head in any position like press operation to be carried out at lower position, extreme top position, changing of tool, power failure etc. it should also prevent downward creep. The safety catcher arrangement actuation to be programmed and interlocked with operation of press. **The arrangement provided to be explained in bid with sketch.**
- 1.2.27 Oil leakage collecting tank shall be provided and suitably located for accumulation of leaked oil with pump to transport the leaked oil to a container for disposal.

1.3 Controls and Operation

- 1.3.1 Operation of the press shall be through PLC-MMI controls provided with suitable safety features of interlocking against faulty sequence of operation. Necessary input devices like electric push buttons and selector switches shall be provided on an ergonomically designed control desk which shall allow a full view of the working area. The selector switches shall select the mode of operation. Besides PLC-MMI display and relevant control buttons, light indicators for safety features like high oil temperature, low oil level, clogged filter, heat exchanger not working etc shall be displayed in the control panel. The panel should also have provision for display of Current and voltage readings, Pressure and Force readings and push buttons for emergency stop, main motor ON/OFF etc. **The drawing of control panel indicating location of various controls provided therein shall be furnished in the bid.**
- 1.3.2 Hydraulic control system shall provide for rapid forward and return motion under no load conditions. It shall be possible to hold the ram under pressure without keeping the control button pressed continuously.
- 1.3.3 It shall be possible to preset the ram force from a minimum of 10% of rated capacity upto a maximum. For this purpose, a hand wheel controlled pressure regulator valve shall be provided with tonnage marking on the indicator plate. **The precise range and steps of control shall be indicated by the bidder.**
- 1.3.4 Pressure gauge calibrated to indicate working pressure as well as total ram force being applied when the press is working, shall be provided for the ram at a suitable location so that it is easily visible to the operator. **Least count for force and pressure on the gauge shall also be indicated in the offer.** The gauge shall have a range of minimum 25% beyond the rated capacity.

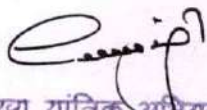

उप मुख्य यांत्रिक अभियन्ता
मध्य रेल, मटुंगा

Dy. Chief Mechanical Engineer
Central Railway Matunga

- 1.3.5 Pilot lamps to indicate the status of various press functions shall be provided at a suitable and easily visible location on the press. The functions for which pilot lamps are required shall include, but need not be limited to, the following:
i. Power 'ON' ii. Pump 'ON' iii. Pressure 'ON'
iv. Oil level low in hydraulic tank
v. Oil temperature high vi. Oil filters clogged
- 1.3.6 A large mushroom type emergency switch shall be provided on the press which shall enable the operator to instantly stop the ram motion. Emergency stop shall override the control push buttons.
- 1.3.7 In case of power failure, the ram shall stop immediately and shall move neither downward nor upward automatically when the power supply comes 'ON' again. Subsequently, the press shall operate only after the ram is retracted to its starting position in manual mode.
- 1.4 **Lubrication**
- 1.4.1 The press shall be provided with an automatic adjustable centralised pressure oil lubrication system to supply a measured quantity of lubricant to each lubrication point. The lubricating oil pump shall be independently driven and interlocked with the main drive so as to ensure pre-lubrication of the press. **The lubrication system shall be explained in the bid with a lubrication circuit diagram. The make of the components in the circuit shall also be indicated in the bid.**

2. GENERAL ELECTRIC SPECIFICATION

- 2.1 The provision of this General Specification shall apply, where ever relevant.
- 2.2 All equipments and material shall comply with appropriate Indian Standards (latest), International Standards or National Standards of the country of origin provided the latter are equivalent to or better than the former. The tenderer shall indicate the Standards applicable. The following standards are applicable in particular.
(Corresponding International Standards like ASA, NEMA, BSS, DIN etc. may also be quoted).
- | | | |
|------|--------------------|--|
| IS : | 325-1979 (latest) | - Three phase induction motors (corresponding to IEC pub-34-1) (Latest). |
| IS : | 1248 (Latest) | - Direct acting indicating analogue electrical measuring instruments and their accessories (corresponding to IEC Pub-51) (Latest). |
| IS : | 1231-1974 (Latest) | - Dimensions of three phase induction motors (corresponding to IEC Pub-721) (Latest). |


उप मुख्य यांत्रिक अभियन्ता
मध्य रेल, माटुंगा
Dy. Chief Mechanical Engineer
Central Railway Matunga

- IS : 1271-1985 (Latest) - Classification of insulation material for electrical machinery & apparatus in relation to their thermal stability in service (corresponding to IEC-Pub85) (Latest).
- IS : 6875 (Latest) - Push Buttons and related control switches corresponding to IEC Pub/73) (Latest).
- IS : 375-1963 (Latest) - Marking and arrangement of switch gear, bus bars, main connection & auxiliary wiring.
- IS : 996-1979 (Latest) - Single phase small AC and universal electrical motors.
- IS : 1356 (Latest) - Electrical equipment of machine tools.
- IS : 2516 (Latest) - Circuit breakers (corresponding to IEC Pub-56) (Latest)

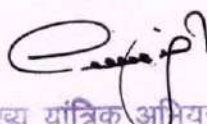
2.3 Unless specified in the main specification, the AC motors and starters shall be of the following type. Tenderer is, however, free to give alternative proposal along with justification, if in his view alternative proposal is warranted by site conditions. Type of motor type of starter.

TYPE OF MOTOR

TYPE OF STARTER

- 2.3.1 Any type of AC motor starting current of which Direct on line. does not exceed 75 amps.
- 2.3.2 AC squirrel cage, introduction motors, starting Star delta or Auto current of which is above 75 amps. if started transformer type. direct on line.
- 2.3.3 AC slipring type motor Resistance type air/fan Cooled
- 2.3.4 AC synchronous or synchronous induction motor. Suitable makers standard.
- 2.3.5 DC motor Resistance type/ Thyristor type.
- 2.4 The control gear for AC/DC motors shall incorporate the following protection devices as concomitant accessories.
- 2.4.1 **No Voltage Protection** - No voltage protection shall be provided so that machine will not start up again by itself when, following an interruption the supply is restored.
- 2.4.2 **Short Circuit Protection** - To protect against short circuits due to insulation failure of faulty connections HRC fuses shall be provided for each motor. The rating of the fuse shall be such as to take care of the over current due to motor starting.
- 2.4.3 **Over Load Protection** - To prevent motors from overloading, overload protection shall be provided separately for each motor. Three phase motors shall be protected by overload tripping devices on each phase.

10


उप मुख्य यांत्रिक अभियन्ता
मध्य रेल, माटुंगा
Dy. Chief Mechanical Engineer
Central Railway Matunga