

Section IITECHNICAL SPECIFICATIONABBREVIATIONS

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
CME	Chief Mechanical Engineer
CME/PCM	Chief Mechanical Engineer/Post Contract Management
CNC	Computer Numeric Control
COFMOW	Central Organization for Modernization of Workshops
COS	Controller of Stores
Db	Decibel
DC	Direct Current
FA&CAO	Financial Advisor & Chief 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


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Specification No.: M/246/1/15/2026-27/Spec/DCHP/ICF"

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:
1.2.1	The leading parameters for the "Double Cylinder Hydraulic Machine for Pressing of Secondary Suspension of ICF Bogie Capacity 20 Tonnes (Each Cylinder)" have been indicated in clause 2.2 of Section I.
1.2.2	Specific Characteristic :
1.2.2.1	Press Frame: The press frame shall be a weld fabricated structure 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.
1.2.2.2	Working Table: Working Table shall be designed as per clause 2.2.2.1 of Section I. It should be a weld fabricated, stress relieved and accurately machined working table of robust design to withstand full working load.
1.2.2.3	Ram-Cylinder Assembly:
(i)	The cylinder shall be machined from carbon steel forgings, accurately bored/ machined, ultrasonically tested 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 during

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	Inspection. Ultrasonic Testing of complete cylinder shall be done in presence of Inspection authority in case cylinder is supplied by Indian Manufacturer.
(ii)	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.
(iii)	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.
(iv)	The piston head shall carry non-metallic piston seals, slide rings and gland packing liners of suitable material such as Tufite-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.
(v)	The ram cylinder shall be forged out of medium carbon steel, machined, ground and hard chrome plated and ground. 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.
(vi)	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.
(vii)	The ram end shall carry 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 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.
(viii)	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.
1.3	Hydraulic System
1.3.1	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.
1.3.2	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 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.

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	<p>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.</p> <p>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 +/-1% of full scale display.</p>
1.3.3	<p>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.</p>
1.3.4	<p>The hydraulic system shall be sealed for protection against contamination.</p>
1.3.5	<p>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.</p> <p>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.</p>
1.3.6	<p>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.</p>
1.3.7	<p>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.</p>
1.3.8	<p>Oil level sight gauge, or any other equipment showing maximum and minimum oil levels, shall be provided on the oil tank.</p>
1.3.9	<p>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 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.</p>
1.3.10	<p>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.</p>
1.3.11	<p>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</p>

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	<p>in the offer.</p> <p>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.</p>
1.3.12	<p>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.</p>
1.3.13	<p>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:</p> <ol style="list-style-type: none"> hydraulic elements hydraulic motor pumps, etc <p>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.</p>
1.3.14	<p>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.</p>
1.3.15	<p>It shall be possible to limit the pressure through relief valves.</p>
1.3.16	<p>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.</p>
1.3.17	<p>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.</p>
1.3.18	<p>The valves in the circuit shall be matched for adequate capacity to ensure a smooth flow.</p>
1.3.19	<p>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.</p>
1.3.20	<p>Restrictions in the pressure line shall be avoided.</p>
1.3.21	<p>The ram speeds shall be adjustable and the control shall be possible through flow control valve. Arrangement provided shall be explained in the bid.</p>
1.3.22	<p>Decompression arrangement shall be provided to release pressure on top position and prevent downward creep. The device shall be explained in the offer.</p>
1.3.23	<p>A safety device shall be provided to retain the moving head in the top position and prevent</p>

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	downward creep. The device shall be explained in the bid.
1.3.24	Turbulence in the tank shall be minimized by providing suitable baffle plates. The offer shall explain how this will be done.
1.3.25	Suitable breathers and strainers of adequate capacity shall be provided in the tank to avoid cavitation.
1.3.26	Deleted.
1.3.27	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.
1.4	Controls and Operation
1.4.1	(a) Operation of the press shall be through Solenoid Operated Directional Controlled Valves. (b) Both cylinders shall be operatable and controllable independently and in synchronizing manner. The selector switches shall be provided to select the mode of operation i.e., Independent and Synchronizing Mode. (c) The machine shall have provision for light indicators for safety features like high oil temperature, low oil level, clogged filter, heat exchanger not working etc. Detail of above provisions shall be furnished in Bid and included in GA Drawing by successful Bidder.
1.4.2	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.
1.4.3	Deleted.
1.4.4	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.
1.4.5	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

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	vi. Oil filters clogged
1.4.6	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.
1.4.7	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.

2.0	GENERAL ELECTRIC SPECIFICATION																		
2.1	The provision of this General Specification shall apply, where ever relevant.																		
2.2	<p>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).</p> <table border="1"> <tr> <td>IS 325-1979 (latest)</td><td>Three phase induction motors (corresponding to IEC pub-34-1) (Latest).</td></tr> <tr> <td>IS 1248 (Latest)</td><td>Direct acting indicating analogue electrical measuring instruments and their accessories (corresponding to IEC Pub-51) (Latest).</td></tr> <tr> <td>IS 1231-1974 (Latest)</td><td>Dimensions of three phase induction motors (corresponding to IEC Pub-72- 1) (Latest).</td></tr> <tr> <td>IS 1271-1985 (Latest)</td><td>Classification of insulation material for electrical machinery & apparatus in relation to their thermal stability in service (corresponding to IEC-Pub- 85) (Latest).</td></tr> <tr> <td>IS 6875 (Latest)</td><td>Push Buttons and related control switches corresponding to IEC Pub/73) (Latest).</td></tr> <tr> <td>IS 375-1963 (Latest)</td><td>Marking and arrangement of switch gear, bus bars, main connection & auxiliary wiring.</td></tr> <tr> <td>IS 996-1979 (Latest)</td><td>Single phase small AC and universal electrical motors.</td></tr> <tr> <td>IS 1356 (Latest)</td><td>Electrical equipment of machine tools.</td></tr> <tr> <td>IS 2516 (Latest)</td><td>Circuit breakers (corresponding to IEC Pub-56) (Latest)</td></tr> </table>	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-72- 1) (Latest).	IS 1271-1985 (Latest)	Classification of insulation material for electrical machinery & apparatus in relation to their thermal stability in service (corresponding to IEC-Pub- 85) (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)
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2.3	<p>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.</p> <table border="1"> <thead> <tr> <th data-bbox="340 296 591 333">TYPE OF MOTOR</th><th data-bbox="1033 323 1310 360">TYPE OF STARTER</th></tr> </thead> <tbody> <tr> <td data-bbox="335 343 979 416">Any type of AC motor starting current of which does not exceed 75 amps.</td><td data-bbox="1022 368 1202 406">Direct on line.</td></tr> <tr> <td data-bbox="332 426 964 530">AC squirrel cage, introduction motors, starting current of which is above 75 amps. if started direct on line.</td><td data-bbox="1017 451 1315 524">Star delta or Auto transformer type.</td></tr> <tr> <td data-bbox="329 534 617 571">AC slipring type motor</td><td data-bbox="1013 561 1413 607">Resistance type air/fan Cooled</td></tr> <tr> <td data-bbox="329 576 964 634">AC synchronous or synchronous induction motor.</td><td data-bbox="1013 607 1349 644">Suitable makers standard.</td></tr> <tr> <td data-bbox="329 644 452 675">DC motor</td><td data-bbox="1013 669 1418 716">Resistance type/ Thyristor type.</td></tr> </tbody> </table>	TYPE OF MOTOR	TYPE OF STARTER	Any type of AC motor starting current of which does not exceed 75 amps.	Direct on line.	AC squirrel cage, introduction motors, starting current of which is above 75 amps. if started direct on line.	Star delta or Auto transformer type.	AC slipring type motor	Resistance type air/fan Cooled	AC synchronous or synchronous induction motor.	Suitable makers standard.	DC motor	Resistance type/ Thyristor type.
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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.												
2.4.4	Single Phasing Protection - A separate current sensitive delayed action single phasing preventor shall be provided for each motor separately. Overload protection shall not be treated as single phasing preventor.												
2.5	Control equipment shall be mounted in separate drip proof enclosures. Control enclosures and compartments are to be so designed as to give adequate protection against ingress of dust, oil, coolant or chips. All control devices like contractors etc. shall be front mounted on a rigidly fabricated metal panel for ease of operation. All other electrics shall be installed that they are readily accessible when the doors and covers are opened. Hinged covers shall be interlocked with the machine tool control to prevent operation of the machine when cover is open.												
2.6	The motor shall be totally enclosed with or without fan cooled frame. Screen protected drip proof type motor may be provided if it is mounted inside protective enclosures.												
2.7	The electrical equipments shall comply with the requirement of Indian Electricity Act and Rules (latest).												

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2.8	All instruments shall be of the Industrial Grade "A" (IS-1248) switch board type the range of the instrument shall be such that the maximum load expected in the circuit shall produce a deflection of 60% to 80% of the full scale.														
2.9	The supplier shall furnish 3 sets of complete electrical and electronic wiring diagrams in full details to enable the maintenance staff to locate faults in the circuits, 3 sets of part catalogues, maintenance manuals operating instructions with details of coils and windings, used in the equipment to facilitate repairs and maintenance should also be supplied.														
2.10	For main motor class minimum "B" Class insulation shall be provided. If any other class of insulation is proposed, detailed justification for providing different class of insulation shall be given.														
2.11	Motors shall be designed to withstand frequent starts, stops and reversals as demanded in the operation of the machine.														
2.12	Two earthing terminals shall be provided on all electric motors including the control gear.														
2.13	Power Supply														
2.13.1	The machine shall be suitable for operation on 415 volts 3 phase 50 cycles AC 3 wire or 4 wire system with neutral solidly earthed. The supply voltage may vary up to +10% -20%. The frequency may vary up to $\pm 3\%$. However, full rated power of the motor shall be available at the lower voltage. Firm should confirm satisfactory performance of the machine at incoming power supply in the range 415V+10%-20% and 50HZ $\pm 3\%$ frequency or should provide voltage stabilizer as specified against clause 2.13.2 below of required capacity.														
2.13.2	The voltage stabilizer, if required, shall conform to: <table border="1"> <tr> <td>Input Voltage</td><td>320 to 460 volts 3 phase 4 wire supply</td></tr> <tr> <td>Output Voltage</td><td>415 volts</td></tr> <tr> <td>Regulation</td><td>$\pm 1\%$ from No load to Full load.</td></tr> <tr> <td>Rate of correction</td><td>20 volts per second per phase.</td></tr> <tr> <td>Wave from distortion</td><td>NIL</td></tr> <tr> <td>Efficiency</td><td>Not less than 97%.</td></tr> <tr> <td>Winding and class of insulation</td><td>Copper wire wound with "B" class of insulation or better.</td></tr> </table>	Input Voltage	320 to 460 volts 3 phase 4 wire supply	Output Voltage	415 volts	Regulation	$\pm 1\%$ from No load to Full load.	Rate of correction	20 volts per second per phase.	Wave from distortion	NIL	Efficiency	Not less than 97%.	Winding and class of insulation	Copper wire wound with "B" class of insulation or better.
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2.13.3	In case of machines equipped with NC, SS, CNC, Thyristor controlled devices and other sophisticated electronic gadgets including microprocessors etc. which are susceptible to power line spikes and surges, a suitable voltage stabilizer and ultra-isolation transformer to cover for the entire electrical load of the machine shall be offered as a concomitant accessory. conforming to Specification for voltage stabilizer as mentioned in clause 2.13.2 above and isolation transformer to the parameters mentioned below.														

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उप मुख्य बांनिक इन्जिनियर (प्लान्ट)
Dy. Chief Mech. Engineer (Plant)

प०उ०रे० यॉ० कारखाना, इज्जतनगर

3.0	GENERAL CHARACTERISTIC
3.1	RIGIDITY AND STABILITY
3.1.1	The machine shall be robust, rigid and of sturdy construction. It shall be designed to meet heavy duty demands of various operations on the machine under normal Workshop environment for such machines. It shall be free for vibrations even when working at full capacity.
3.1.2	All machine castings shall be made of close grained high grade cast iron like Mehanite or equivalent materials meeting IS-210 Standards to ensure durability and rigidity. The casting shall be thermal stress relieved to ensure stability and continued accuracy.
3.1.3	All machine fabrications of critical load bearing assemblies like bed\$, columns etc. shall be adequately strengthened and stress relieved.
3.1.4	Change in ambient temperature shall not affect the performance of the machine.

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