



**DESIGN, MANUFACTURE, SUPPLY, DELIVERY,
INSTALLATION, TESTING, CALIBRATION AND
COMMISSIONING OF A HEAVY DUTY
ELECTRO-HYDRAULIC 400 TON
SYNCHRONIZED CNC PRESS BRAKE.**

311 SOLOMON MAHLANGU DRIVE, ROSSBURGH.

REFERENCE NO.: FAI_DBN_SOW_005

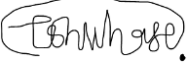
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DOCUMENT AUTHORITIES

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1. INTRODUCTION

This specification is for the:

#	TASK	REQUIRED
1	Engineering survey, structural assessment	
2	Manufacture	✓
3	Design	✓
4	Supply	✓
5	Delivery	✓
6	Installation	✓
7	Documentation	✓
8	Testing	✓
9	Training	✓
10	Commissioning	✓
11	AIA Report	

2. Specification Requirements

Item no.	Minimum Requirements																										
2.1	Required machine technical specification:																										
2.1.1	Scope of supply: - One new heavy duty electro-hydraulic synchronised press brake complete with tooling. - CNC controller with graphical programming capability. - Back gauge system. - Hydraulic, electrical, and safety systems. - Installation, alignment, testing, and commissioning. - Operation and maintenance manuals. - Operator and maintenance training. - Recommended spare parts list.																										
2.1.2	Minimum Technical Requirements: <table border="1"> <thead> <tr> <th>Parameter</th><th>Requirement</th></tr> </thead> <tbody> <tr> <td>Machine type</td><td>Electro-hydraulic synchronized CNC press brake</td></tr> <tr> <td>Tonnage Capacity</td><td>400 tons (4000 kN)</td></tr> <tr> <td>Bending length</td><td>Minimum 4000 mm</td></tr> <tr> <td>Distance between housings</td><td>Minimum 3100 mm</td></tr> <tr> <td>Throat depth</td><td>Minimum 400 mm</td></tr> <tr> <td>Ram stroke</td><td>Minimum 300 mm</td></tr> <tr> <td>Open height</td><td>Minimum 570 mm</td></tr> <tr> <td>Approach speed</td><td>Minimum 100 mm/s</td></tr> <tr> <td>Pressing speed</td><td>Minimum 8-10 mm/s</td></tr> <tr> <td>Return speed</td><td>Minimum 90-100 mm/s</td></tr> <tr> <td>Positioning accuracy</td><td>±0.01 mm or better</td></tr> <tr> <td>Repeatability</td><td>±0.005 mm or better</td></tr> </tbody> </table>	Parameter	Requirement	Machine type	Electro-hydraulic synchronized CNC press brake	Tonnage Capacity	400 tons (4000 kN)	Bending length	Minimum 4000 mm	Distance between housings	Minimum 3100 mm	Throat depth	Minimum 400 mm	Ram stroke	Minimum 300 mm	Open height	Minimum 570 mm	Approach speed	Minimum 100 mm/s	Pressing speed	Minimum 8-10 mm/s	Return speed	Minimum 90-100 mm/s	Positioning accuracy	±0.01 mm or better	Repeatability	±0.005 mm or better
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2.1.3	Frame and Mechanical Construction The machine frame shall:																										

	• Be fabricated from high-strength steel plate. • Be fully welded and stress relieved after welding. • Be machined on a CNC machining center to ensure parallelism and squareness. • Provide sufficient rigidity to minimize deflection during full-load operation. • Include precision-ground ram guides and wear-resistant guide surfaces.												
2.1.4	Hydraulic System The hydraulic system shall include: • Electro-hydraulic servo synchronization of the ram (Y1/Y2 axes). • Proportional hydraulic valves. • Overload protection. • Pressure relief and overflow protection. • Oil level and temperature monitoring. • Leak-free hydraulic piping and fittings. • Continuous-duty operation capability at rated load.												
2.1.5	CNC Controller The CNC controller shall provide: • Touch-screen graphical interface (minimum 15" display). • 2D profile programming capability. • Automatic bend sequence calculation. • Automatic bend allowance/deduction calculation. • Tool library management. • Part program storage. • USB and/or Ethernet connectivity. • Diagnostic and alarm functions including maintenance notifications • Support for offline programming software. Acceptable controller brands include: • Delem (DA-53T, DA-58T, DA-66T or equivalent) • ESA (S630/S640 or equivalent) • Cybelec (ModEva or equivalent)												
2.1.6	CNC Axes Minimum axis configuration: <table border="1" data-bbox="268 1375 842 1585"> <thead> <tr> <th>Axis</th><th>Function</th></tr> </thead> <tbody> <tr> <td>Y1, Y2</td><td>Independent ram synchronization</td></tr> <tr> <td>X</td><td>Backgauge horizontal positioning</td></tr> <tr> <td>R</td><td>Backgauge vertical positioning</td></tr> <tr> <td>Z1, Z1</td><td>Independent finger positioning</td></tr> <tr> <td>Crowning</td><td>Automatic compensation axis</td></tr> </tbody> </table> Preferred configuration: • 6+1 or 8+1 axis system including Z1/Z2 backgauge finger positioning and sheet support control.	Axis	Function	Y1, Y2	Independent ram synchronization	X	Backgauge horizontal positioning	R	Backgauge vertical positioning	Z1, Z1	Independent finger positioning	Crowning	Automatic compensation axis
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2.1.7	Backgauge System The backgauge shall: • Include at least two adjustable backgauge fingers. • Be servo-driven • Use precision ball screws and linear guideways. • Provide positioning accuracy better than ± 0.05 mm. • Be capable of automatic movement between bends.												
2.1.8	Crowning System												

	The machine shall include: • CNC-controlled hydraulic or mechanical crowning system. • Automatic compensation for table and ram deflection. • Manual crowning systems will not be accepted.
2.1.9	Tooling The supplier shall provide: • Hardened and precision-ground upper punches. • Hardened and precision-ground lower dies. • Segmented tooling suitable for general fabrication work. • Quick-change hydraulic or mechanical clamping system. • Tool material hardness: minimum HRC 45–50.
2.1.10	Electrical System The electrical system shall: • Operate on 400 V $\pm 10\%$, 50 Hz, 3-phase power supply. • Include a main isolator switch. • Use industrial-grade components from recognized manufacturers. • Be wired and laid out exactly in accordance with the electrical schematics • Comply with OSHACT and SANS 10142-1
2.1.11	Safety Requirements The machine must comply with the following standards but not limited to: • OSHACT • SANS 10142-1 • SANS 13849-1 • SANS 62061 • SANS 5012622 / EN 12622 • SANS 347 The machine shall comply with applicable safety standards and include: • CE conformity or equivalent international safety certification. • Front laser or light-curtain guarding. • Emergency stop buttons at operator stations • Two-hand or foot-pedal control with safety interlock. • Hydraulic overload protection. • Hydraulic cylinders skew protection • Guarding of moving and pinch-point areas with safety interlocks • Well tired or safety rated components and safety principles must be employed for safety critical machine components • Monitoring of safety critical components to detect faults • Fail safe design and diagnostic coverage • Dual-channel redundancy must be employed on safety critical components • Safety electrical interlocks along each axis to prevent overtravel and unsafe machine recovery
2.1.12	Performance Requirements The machine shall be capable of: • Producing repeatable bends within specified tolerances. • Moving the ram and backgauges at specified speeds • Stopping the machine fast enough and reliably to stop the machine when emergency stops, safety devices and end of travel limits are triggered • Performing multi-step and complex bend sequences using CNC programming.

2.1.14	Installation and Commissioning The supplier shall: • Install and level the machine. • Connect utilities. • Conduct tests on the installed electrical system to ensure compliance with relevant standards and SANS codes such as but not limited to SANS 10142-1, ISO 13849-1, IEC 62061 • Conduct tests of the hydraulic system to ascertain compliance with PER in accordance to SANS 347 • Calibrate the machine to measure accurately along each axis to specified tolerances • Verify bending precision and accuracy including positioning of all other axes • Verify that the system behaves in accordance to specifications or expectations • Perform functional testing • Train operators and maintenance personnel.
2.1.15	Optional Features The purchaser may request: • Automatic tool changer. • Robotic loading/unloading interface. • Angle measurement system. • 8-axis or higher CNC configuration. • Remote diagnostics capability. • Industry 4.0 connectivity.
2.2	Training
2.2.1	Training must be provided on the operation and maintenance of the machine.
2.3	Project Plan:
2.3.1	The contractor shall submit, a full program showing all aspects of the work to be carried out as part of this contract. The program shall also be updated as the project evolves on site, to reflect the true situation of the site progress, on a weekly basis. With special attention being given to critical path items.
Item no.	Minimum Requirements
2.4	Site Meetings.
2.4.1	The contractor shall attend all site progress meetings, and site inspections which may be called.
2.5	Site Access.
2.5.1	The contractor shall be aware that the contract shall be completed during normal working hours, and in the event of unplanned necessity, the Project Manager must be notified.
2.6	Guarantee Period.
2.6.1	The contractor shall allow for a guarantee period, of two years after the installation has been accepted by Transnet. This guarantee covers defects in materials, workmanship, hydraulic system, electrical system, CNC system, and major mechanical components.
2.7	Handover.
2.7.1	During the hand over the equipment shall be fully functional, meeting all technical specifications and adhering to relevant standards and regulations with proper certification as outlined in this item no.
2.8	Documentation.
	Documentation required before any work commence:
2.8.1	Scope of work to be done on the machine with brochure of the equipment that will be installed on the machine.

2.9	Documentation to be provided on project completion
2.9.1	Operating Manual
2.9.2	Maintenance Manual
2.9.3	Electrical Schematics
2.9.4	Hydraulic Schematics
2.9.5	Mechanical or Structural Schematics
2.9.6	Complete spare parts catalogue for the electrical, hydraulic and mechanical systems with OEM and part numbers
2.9.7	A signed off three phase CoC issued in accordance with SANS 10142-1 (The Wiring of Premises)
2.9.8	Certificate of machinery conformity to certify compliance with SANS 60204-1 / IEC 60204-1 (Safety of Machinery – Electrical Equipment of Machines), SANS 13849-1 including other relevant mandatory
2.9.9	Press brake specific Safety Certificate conforming to SANS 5012622 / EN 12622 (Safety of Machine Tools – Hydraulic Press Brakes)
2.9.10	Pressure Equipment Regulation (PER) Certificate conforming to SANS 347 (Categorization and Conformity Assessment of Pressure Equipment)
2.9.11	Site Acceptance Test (SAT) Log
2.9.12	Operator Competence Certificate
2.9.13	Calibration Certificates where applicable
2.9.14	Certificates of Compliance where applicable
2.10	General:
2.10.1	No metal or material belonging to TE shall be removed from the premises. (To be handed over to TE).
2.10.2	Damage to any existing services shall be repaired by the supplier.
2.10.3	All workmanship shall be of a high standard in all aspects.
2.10.4	Area to be cleaned and neat on completion.

3. HEALTH AND SAFETY REQUIREMENTS

- 3.1 All equipment and installation whether detailed in this specification or not shall comply with the requirements of the Occupational Health and Safety Act 85 of 1993 as amended and all other applicable legislation including specific set of regulations and local authority bylaws where applicable.
- 3.2 The contractor shall hold monthly safety meetings with staff and records of minutes shall be kept on file on site.
- 3.3 The contractor shall be available for monthly meetings with Transnet Management. A schedule for these meetings may be agreed upon.

4. SHE SPECIFICATION

- Prior to commencement of contract, the contractor shall be issued with a SHE specification in order to compile a SHE file in line with TE requirements.
- Prior to establishing on site, it is an explicit requirement of this contract that all of the Contractor's personnel directly involved with this contract, including those of sub-contractors, attend a Safety induction course.
- Transnet will provide the course free of charge and attendance is compulsory for all personnel under the control of the Contractor who, during the duration of the contract, will be present on site whether on a full time or adhoc basis.
- The contractor must allow for all additional charges because of these requirements as no claims for extras will be accepted in connection with the foregoing.

5. LEGISLATION AND TRANSNET ENGINEERING (TE) SHE REQUIREMENTS.

- The successful contractor is required to conduct a Risk assessment to ascertain all potential risks associated with this project. The completed risk assessment is to potential risks associated with this project. The completed risk assessment is to be formally submitted to the Risk department via the project manager at least two weeks prior to the commencement of the actual project.
- A safety file and associated documents will be required from a successful tenderer and such will be communicated by the Risk department.