Bharat Heavy Electricals Limited

(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
An ISO 9001 Company
CAPITAL PURCHASE / MATERIALS MANAGEMENT / MANUFACTURING

ENQUIRY	Phone: +91 431 257 75 75 Fax : +91 431 252 07 19 Email : rrmanohar@bheltry.co.in Web : www.bhel.com

	Enquiry Number:	**Enquiry Date:**	**Due date for submission of quotation:**
	2620600082	**11.12.2006**	**13.01.2007**
Your are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order			

Item	**Description**	**Quantity**	**Delivery Schedule**
10	Power Pack and Cylinders for Flipping Arm Station as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com)	1 Set	15.03.2007
20	Power Pack and Cylinders for Pull Out Machine as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com)	1 Set	15.03.2007

Note:

(1) The detailed Technical Specification along with technical point-by-point confirmation, Commercial Terms & Conditions applicable for this Enquiry, Confirmation of acceptance for BHEL commercial terms & conditions and Price Bid formats have been posted in BHEL Corporate web site www.bhel.com under Enquiry reference "2620600082". Your offer should be based on all the above documents.

(2) Also, you are requested to fill in the Supplier Registration formats available in www.bhel.com (under Advancement – Supplier Registration) and send it along with your offer.

Tenders should reach us before 14:00 hours on the due date Tenders will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present	Yours faithfully, For BHARAT HEAVY ELECTRICALS LIMITED Sr. Dy. Genl. Manager / Capital Purchase / MM / Manufacturing

SPECIFICATION FOR HYD. POWER PACK FOR
FLIPPING ARM STATION

1.0. SCOPE:	**BIDDER TO CONFIRM**
Design, Manufacture, supply, commissioning and prove out of Hydraulic power pack and electrical control for the flipping arm system applications with suitable hydraulic cylinders, high pressure hoses & fittings and steel pipelines. The power pack will be located at bldg.50 and the flipping arms with cylinders will be located near the power pack. The span of 4 meters distance for each flipping arm approximately and the distance between power pack and the flipping arm will be nearly 5 meters. The required hydraulic circuit drawing (Drawing No.: 2M-10A13-04645 & BOM Drg. No. 3M-10A13-12795) and lay-out drawing (Drawing No.: 3M-02F13-12798) are enclosed for reference.	
2.0 Application:	
The power pack with electrical Panel is used for flipping of tubular panels manufactured for boiler applications. **The approximate size of the panel to be flipped: Width: 3 meter, Length: 25 meters and approximate weight – 5 Ton**. The tubular panel is first placed on a structural roller stand (with Flipping Arm-1), which will be tilted by means of 6 nos. of hydraulic cylinders. Another roller stand is available on the adjacent side to receive the job while flipping. This stand is also having a flipping arm-2, operated by means of another set of 6 nos. of hydraulic cylinders. AUTO and MANUAL modes of operations are to be provided in the machine for flipping arm tilting.	
2.1. The sequence of operation for AUTO mode for flipping is as below:	
The panel is normally being placed on the roller stand for moving towards the machine with the support of roller stand. 1. **The Flipping arms *(6 Nos.)*- 1** below the tubular panel is held horizontal to take the load of panel from the roller stand for change over to the other flipping arm- 2 in the adjacent roller stand.	
2. **The Flipping arms *(6 Nos.)*- 2** located on the adjacent side will be moved	

to 120 degrees from horizontal by one set of hydraulic cylinders (6 Nos.). The end of this stroke is decided by the position of proximity limit switch provided on the structure of the machine.	
3. The tubular panel, which is placed on the roller stand-1 will be tilted through flipping arm-1 by one set of hydraulic cylinders (6 Nos.) to about 60 degrees. The end of the stroke is also decided by the position of proximity limit switch provided on the structure of the machine	
4. Now both the flipping arms are moved together along with job in between, towards the flipping arm-2 by 60 degrees and on roller stand 2. The end of this stroke is also decided by the position of proximity limit switch provided on the structure of the machine	
5. The flipping arm –1 will be returned to its original horizontal position. The end of this stroke (zero position) is also decided by the position of proximity limit switch provided on the structure of the machine.	
6. The flipping arm –2 will be brought to horizontal position and the job is placed on the roller stand-2 for further welding. The end of this stroke (zero position) is also decided by the position of proximity limit switch provided on the structure of the machine.	
7. The entire operation of one cycle should be completed within 90 –100 seconds.	
All the above operations are to be performed in sequence by operating a selector switch by selecting the AUTO mode and AUTO – START / STOP.	
The critical requirements of the system are:	
(a)The set of 6 Nos. of cylinders on the flipping arms should move uniformly without difference in speed (synchronization of cylinders with suitable valves is required).	
(b)While flipping the job together with both the arms, the speeds of both the arms should also be synchronized.	
©Suitable counter balancing / brake valves are to be provided in the circuit to prevent free falling of job while flipping.	
2.2. The operation for MANUAL mode:	
In manual mode, the flipping arms –1 & 2 are independently operated by	

means of Momentary ON type (spring centered) three position selector switches for UP / DOWN & HOLD functions. One selector switch for each arm to be provided.	
3.0. CRITICAL PARAMETERS OF HYDRAULIC SYSTEM:	
Pump: Variable displacement axial piston pump. Max. Flow: 57 lpm. Max. pressure of the system : 210 bar.	
Electric Motor: 22KW / 1500rpm / 415V – 50Hz.	
Cylinder size: Dia. 80 x 45 / 500mm (Stroke) – Qty. 12 Nos. in each system. As per drawing: 3M-02-F13-12799.	
4.0. Hydraulic system – Features:	
1. The hydraulic power pack shall be provided with minimum number of pipes / pipe joints and as far as possible usage of manifolds / stacked valves construction is preferred.	
2. The selection of the hydraulic valves and other accessories shall be based on the flow and pressure applicable to that part of the circuit.	
3. The latest version of pumps, valves, accessories, etc., should be used only with REXROTH / VICKERS make. The seals used in cylinders shall be of Merkel / Parker / Bushak + Shamban / Hunger / Simrit make.	
4. The Power pack should be tropicalised for Indian conditions - for an ambient temperature of 40 deg C. Suitable oil cooling arrangement to be provided – preferably with fan cooled radiator type or with Oil chiller & Heat exchanger, considering 3-shift operation of the machine and to maintain the oil temperature within 45 deg C.	
5. All the tubes / hose fittings shall be of standard weld nipple with O-ring seating type (DIN 3865) heavy series fittings only and no ferrule joints are to be proposed in the hydraulic system. All threaded connections shall be of metric sizes.	
6. Pressure measuring minimess check points (preferably with ¼" BSP stud end) to be provided, wherever required for quick pressure measuring and pressure setting while trouble shooting. One set of handheld minimess pressure gauge (glycerin filled) of suitable range with minimess hose (1 to 1.5m length) also has to be supplied along with the power pack. Fixed pressure gauges provided in the system should be of glycerin filled type	

and should have suitable gauge isolators.	
7. Suitable vibro-mounts, compensators (flexible bellows), delivery hose between pump and valve block, polypropylene pipe & hose clamps, etc are to be provided to minimize the vibration induced and transmitted to the hydraulic joints.	
8. The oil to be used shall be of standard ISO Viscosity Grades – 32 / 46 / 68 / 150 Centi-Stokes at 40 deg C. The grade of oil and capacity of tank should be painted on the tank near the oil filler unit.	
9. The control voltages for all the Solenoids of the valves shall be of 24-V DC and all solenoid operated DC valves should have manual over-ride provision and light indicating solenoids.	
10. Sufficient number of filter units for the required level of cleanliness is to be provided with clog indicators and preferably with reusable type of filter elements. As an option, a centrifuge / electrostatic filter unit for oil, dust and moisture separation shall be offered.	
11. The pipelines to be painted with standard colours as per the colour coding accepted internationally for hydraulic systems. The power pack shall be painted in apple green colour.	
5.0. Electrical System – Features:	
1. Electrical control circuit shall be designed and manufactured incorporating the safety interlocks and logics as required by the hydraulic function.	
2. The electrical system shall have **one** electrical control panel near the power pack, **one** operating panel located near the operator at a distance of around 25 meters from the power pack and **two** portable operating panels which are fitted on either side of the machine operating panel at a distance of 10 m each.	
3. The electrical control panel near the power pack shall have a main MCCB for mains control, Mains & Control ON and Hydraulic ON indicating lamps. Necessary switchgear, protection elements, Contactors, MCBs, control relays, control transformer for 24V DC supply shall be provided in the power panel with necessary interconnection and wiring. This control panel shall have IP54 protection.	
4. Each operating panel shall have the following switches (The operating panel shall be compact in size) :	
(1) Two push buttons for Hydraulic Pump ON/OFF with light indications.	

(2) One Emergency Mushroom type OFF switch.	
(3) One selector switch of retaining type for AUTO / MANUAL mode selection.	
(4) Two push buttons for START / STOP functions in AUTO mode with light indications.	
(5) Two numbers of momentary ON type (spring returned) three position selector switches for UP / DOWN & HOLD functions in MANUAL mode. One selector switch for each arm is to be provided.	
5. Suitable Proximity limit switches – 6 Nos. with 10-meter cable for each switch to be supplied and installed at site.	
6. Supply, laying and end termination (with ferrule numbering) of required size of Power and control cable with copper conductor in flexible metallic hose (PVC overlapped) for the motor, hydraulic valves, control elements shall be done by the supplier.	
6.0. Double acting – Hydraulic cylinders:	
1. Cylinder Specification:	
Piston diameter: 80 mm Rod diameter : 45 mm Stroke length : 500 mm	
Major & mounting dimensions: as per Drawing No. 3M02-02-F13/12799.	
Maximum operating pressure: 210 Bar. Hydraulic Testing pressure: 325 Bar.	
2. Cylinder bore and rod should be hard chrome plated to 55 HRC (min) and 40 microns thick (min) and the supplier should produce test certificate for the hardness and chrome plating thickness.	
3. Latest sealing arrangement with bearing guide strips to work in tilting conditions of the cylinder. Only standard sized imported seals of Hunger/ Bushak & Shamban / Merkel / Hallite / Parker / Simrit is acceptable. For piston seals, DAS compact seals are preferable.	
Important aspects of the specification adherence should be declared during offering.	

1. The period of supply & commissioning should be 8 weeks.	
2. All hydraulic valves & pumps are as per spec.	
3. Declaration of site visit and acquaintance.	
7.0. General points:	
1. Input power supply of 415v, 3 ph, 3 wire, 50 Hz with isolator will be provided by BHEL.	
2. The control panel should be of self standing type.	
3. The electric motor shall be of Kirloskar / ABB / Siemens make conforming to S1 – continuous duty with IP-55 protection.	
4. All electrical components in control panel / operating panel should be of reputed makes of Siemens / L&T / Telemechanic only.	
5. All proximity sensors should be of reputed makes like Technic / Jayshree.	
6. The operating panel should have sufficient aesthetic appearance and ergonomic to normal operation.	
7. All electrical terminations to be provided with suitably sized cable glands.	
8. The power pack and all connected materials are to be selected in accordance with IS 10481-2002 /ISO 4413-1998.	
9. The power pack shall be fitted with lifting hook for easy movement.	
10. **Supplier shall visit the site and see the existing facility for complete clarity in understanding of our system requirements before submission of offer.**	
11. It is the responsibility of vendor to erect and commission the above system with sufficient manpower, tools & tackles and required fasteners.	
12. BHEL shall provide all the civil work if required. Necessary power, water, compressed air and any machining required at site will be provided by BHEL free of cost.	
13. Supplier shall quote for materials supply and erection work separately.	
14. The fixing of cylinder with the flipping arm and base, hydraulic hoses, tubes & fittings from cylinders to the power pack with the regulating valves are to be fastened and clamped properly in order to avoid in between looseness, vibration, clamping failures, etc..	

8.0. Documents to be provided along with offer for technical evaluation:	
The following documents to be provided along with offer for technical evaluation. In the absence of all the required documents, the offer will not be considered.	
(1) Hydraulic circuit with Bill of materials giving complete purchase specifications and make of each item.	
(2) Technical catalogues of pump, seals, valves and fittings.	
(3) Cross sectional assembly drawing of cylinder with major and mounting dimensions.	
(4) Details of sealing arrangement and proposed seal make and part no.	
(5) Electrical schematic and control circuit diagram with complete bill of materials including makes of each components in it.	
9.0. Documents to be provided for approval before manufacturing:	
In case of ordering, the supplier should provide the following documents for our approval before manufacturing.	
(1) Hydraulic circuit with Bill of materials giving complete purchase specifications and make of each item.	
(2) Cross sectional assembly drawing of cylinder with complete dimensions and sealing arrangements.	
(3) Electrical schematic and control circuit diagram with complete bill of materials including makes of each components in it.	
(4) Electrical wiring diagram with ferrule numbers.	
(5) Control panel lay-out.	
10.0. Documents to be supplied along with material supply:	
Three sets of the following documents are to be provided along with each power pack (Both hard copy and Soft copy-CD):	
a.Hydraulic Circuit (preferably with standard coloring) with Bill of materials giving purchase specifications for each item.	
b.Function diagram for the entire operations of the system giving solenoid sequences, interlocks and pressure & flow parameters for each operation.	
c.List of rubber items like O-rings, Piston / rod seals, wipers, etc. with complete purchase specification.	
d.Pump lay out and piping lay out giving sizes of each pipe line.	

e.Cross sectional assembly drawing for all the cylinders giving major dimensions, seal details, mounting details, pressure ratings, etc.	
f.Detailed technical Catalogues in original for all components in the system.	
g.Electrical schematic/ control circuit diagram with Bill of materials giving complete purchase specification of all bought out components.	
h.Electrical wiring diagram with ferrule numbers.	
i.Control panel lay-out.	
11.0. Testing and Inspection:	
1. The power pack will be tested at supplier's works for the operating parameters.	
2. The cylinder will be tested at supplier's works by the Indenter before despatch for the test pressure of 315 bar for a holding time of minimum 15 minutes at both ends for leak free sealing.	
3. The test certificate for the hardness and chrome plating thickness to be produced.	
4. The supplier should provide all the facilities for testing at suppliers work and prove the performance of the power pack and cylinders.	
12.0 Qty Required:	
1. Power pack (including all pipe lines and hoses for connecting 12 cylinders) - 1 No.	
2. Hydraulic Cylinders – 14 Nos.	
12.10. Spares:	
1. Complete seal kit for the above hydraulic cylinder -- 3 sets.	
2. Spare Hydraulic hoses corresponding to 1 machine (1 power pack + 12 Cylinders) – Qty: 1 set	
3. Hydraulic valves 1 No. of each type	

IMPORTANT NOTE : VENDOR SHALL FURNISH POINT TO POINT CONFIRMATION IN THE ABOVE FORMATE WITHOUT FAIL.

SPECIFICATION FOR HYD. POWER PACK AND CYLINDERS FOR
PULL OUT MACHINE

1.0. SCOPE:	**BIDDER TO SPECIFY.**
Design, Manufacture, supply, commissioning and prove out of Hydraulic power pack and electrical control for **PULL OUT MACHINE** applications with suitable hydraulic cylinders, high pressure hoses & fittings and steel pipelines. The power pack will be located at Pull Out machine for BHEL / Trichy. The cylinders will be located on the machine adjacent to the power pack. The distance between power pack and the cylinders on the Pull Out machine will be nearly 6 meters. The required hydraulic circuit drawing is need to be prepared by the vendor as per the logical sequence explained in the specifications.	
2.0 Application:	
The power pack with electrical Panel is used for Panel Pull Out machine to push the tube of 76 dia x 12 mm thickness to a height of 100 mm in an angle 30 degree for the tubular panels manufactured for boiler applications. The approximate size of the panel in which tube is to be pushed out for the above dimension is : Width: 3 meter, Length: 25 meters and approximate weight – 5 Ton. The tubular panel is first placed on a structural roller stand and moved towards the pull out machine & positioned across the cylinders. This push up of tubes is required for different sizes and thickness of tubes. This push up is to be done on the panel by means of hydraulic cylinders from the bottom with back up support of vertically located hydraulic cylinder to hold the female die.	

The power pack will be operated manually, auto operation not necessary.	
2 equal capacity push up hydraulic operated cylinders are placed on the swivel support rotatable by 360 degrees and fixed on the square base plate with locking arrangement. The 2 cylinders are kept at a permanent distance with a pitch for a specific period of operation. These 2 cylinders will be moved parallely by a hydraulic cylinder towards further end and to the cylinder end by the same hydraulic power pack. The pitch between the 2 push up hydraulic cylinders are adjustable by the screw rod and ball screw connected with the hydraulic cylinder rod. In case of pitch change, the 2 push up cylinders can be moved closer or away from each other by the screw rod and ball screw manually and locked in the required pitch distance between the cylinder by the anchor pin. The ball screw is fixed on the swivel frame support plate at the bottom. The top clamp arrangement is made to slide across the width of the pull out machine on the guide ways of the top box channel of the upper frame of the pull out machine. This top clamping arrangement is being moved in the transverse direction across the panel to the required position by a hydraulic cylinder from one end of the pull out machine at the top. Once the top clamp is positioned, the top die in the clamp is moved up and down by another hydraulic cylinder. Therefore we can define the cylinders as follows:-	
The above power pack will operate all the hydraulic cylinders.	
(A)2 push up cylinders A1 & A2 (Drg.No. 3-M-02-F37- 12797) .	
(B) 1 cylinder to move the push up cylinders with its saddle across the width of the pull out bottom frame for positioning the push up cylinders.	

(C) 1 cylinder to move top clamping die across the top frame within the width of pull out top frame.	
(D) 1 cylinder to hold the clamping die vertically with its pressing tool to form the required push out of the panel tube.	
2.1. The sequence of operation : The panel is normally being placed on the roller stand for moving towards the machine with the support of roller stand.	
(1) The panel is positioned as per the marking of the tubes to be pushed by the cylinder within the pull out machine frame with to and fro motion.	
(2) One hydraulic cylinder of pair A1 & A2 is positioned below the panel with required swiveling by the hydraulic cylinder (B) for push out operation.	
(3) The top clamping die is moved in the transverse direction on the top frame by the hydraulic cylinder © to the corresponding position of the cylinders A1 or A2 .	
(4) The top cylinder (D) on the clamping die is moved with its tool die in the vertically downward direction and locked by a mechanical stopper between the tool die and the frame.	
(5) The cylinder A1 or A2 is held against the top cylinder (D) tool die is being operated to push out the panel tube in 30 degree angle determined by the fixed position swivel base plate to a stroke length of 100 mm and gets released.	
(6) The same operation of (5) can be repeated as per the position requirement of the panel for a different tube pull out.	
(7) The operation (5) & (6) will be repeated for pushing the adjacent tubes in the panel with a swiveling of base frame 180 degree of the respective cylinders A1 & A2 as per the	

requirement..	
(8) All cylinders will operate independently.	
REQUIRED CYLINDER SIZES	
1. 2 Nos. of A1 & A2 cylinders of stroke (Drg.No. 3-M-02-F37-12797) piston dia 203 mm, Piston rod dia 180 mm, stroke length 225 mm. Height of cylinder is 452 mm. The pre-projected length of piston is 28 mm for tool mounting, foot mounted non-standard.	
2. 1 No. of cylinder (B) piston dia 100 mm, rod dia 45mm stroke length 2000 mm being operated by 6 bar air equivalent to hydraulic cylinder is required with stroke length constant with front side flange mounting.	
3. 1 No. of cylinder (C) piston dia 100 mm, rod dia 45mm stroke length 2000 mm being operated by 6 bar air equivalent to hydraulic cylinder is required with stroke length constant with front side flange mounting.	
4. 1 No. of cylinder (D) piston rod dia 100 mm rod dia 45mm stroke length 120 mm being operated by 6 bar air equivalent to hydraulic cylinder is required with stroke length constant with front side flange mounting. The cylinder rod pre-projected length is about 250 mm.	
5. Cylinder bore and rod should be hard chrome plated to 55 HRC (min) and 40 microns thick (min) and the supplier should produce test certificate for the hardness and chrome plating thickness.	
6. Latest sealing arrangement with bearing guide strips to work in tilting conditions of the cylinder. Only standard sized imported seals of Hunger/ Bushak & Shamban / Merkel / Hallite / Parker / Simrit is acceptable. For piston seals, DAS compact seals are preferable.	

3.0. CRITICAL PARAMETERS OF HYDRAULIC SYSTEM:	
Pump: Variable displacement axial piston pump. Max. Flow: 20 lpm. Electric Motor: 10 KW / 1500rpm / 415V – 50Hz.	
Max. pressure of the system : 210 bar.	
4.0. Hydraulic system – Features:	
1. The hydraulic power pack shall be provided with minimum number of pipes / pipe joints and as far as possible usage of manifolds / stacked valves construction is preferred.	
2. The selection of the hydraulic valves and other accessories shall be based on the above flow and pressure applicable to the above selected cylinders operation.	
3. The latest version of pumps, valves, accessories, etc., should be used only with REXROTH / VICKERS make. The seals used in cylinders shall be of Merkel / Parker / Bushak + Shamban / Hunger / Simrit make.	
4. The Power pack should be tropicalised for Indian conditions - for an ambient temperature of 40 deg C. Suitable oil cooling arrangement to be provided – preferably with fan cooled radiator type or with Oil chiller & Heat exchanger, considering 3-shift operation of the machine and to maintain the oil temperature within 45 deg C.	
5. All the tubes / hose fittings shall be of standard weld nipple with O-ring seating type (DIN 3865) heavy series fittings only and no ferrule joints are to be proposed in the hydraulic system. All threaded connections shall be of metric sizes.	

6. Pressure measuring minimess check points (preferably with ¼" BSP stud end) to be provided, wherever required for quick pressure measuring and pressure setting while trouble shooting. One set of handheld minimess pressure gauge (glycerin filled) of suitable range with minimess hose (1 to 1.5m length) also has to be supplied along with the power pack. Fixed pressure gauges provided in the system should be of glycerin filled type and should have suitable gauge isolators.	
7. Suitable vibro-mounts, compensators (flexible bellows), delivery hose between pump and valve block, polypropylene pipe & hose clamps, etc are to be provided to minimize the vibration induced and transmitted to the hydraulic joints.	
8. The oil to be used shall be of standard ISO Viscosity Grades – 32 / 46 / 68 / 150 Centi-Stokes at 40 deg C. The grade of oil and capacity of tank should be painted on the tank near the oil filler unit.	
9. The control voltages for all the Solenoids of the valves shall be of 24-V DC and all solenoid operated DC valves should have manual over-ride provision and light indicating solenoids.	
10. Sufficient number of filter units for the required level of cleanliness is to be provided with clog indicators and preferably with reusable type of filter elements. As an option, a centrifuge / electrostatic filter unit for oil, dust and moisture separation shall be offered.	
11. The pipelines to be painted with standard colours as per the colour coding accepted internationally for hydraulic systems. The power pack shall be painted in apple green colour.	
5.0. Electrical System – Features:	

1. Electrical control circuit shall be designed and manufactured incorporating the safety interlocks and logics as required by the hydraulic function.	
2. The electrical system shall have **one** electrical control panel near the machine. **one** operating panel located near the machine.	
3. The electrical control panel near the power pack shall have a main MCCB for mains control, Mains & Control ON and Hydraulic ON indicating lamps. Necessary switchgear, protection elements, Contactors, MCBs, control relays, control transformer for 24V DC supply shall be provided in the power panel with necessary interconnection and wiring. This control panel shall have IP54 protection.	
4. Each operating panel shall have the following switches (The operating panel shall be compact in size) :	
1. Two push buttons for Hydraulic Pump ON/OFF with light indications. 2. One Emergency Mushroom type OFF switch. 3. Two numbers of Momentary ON type (spring returned) 3 way selected switch for cylinders A1 & A2 up / down & Hold (neutral) functions. 4. One number of 3 way momentary ON type (spring return) switch for cylinder (B) up and down and Hold function. 5. One number of 3 way momentary ON type (spring return) switch for cylinder (C) up and down and Hold function. 6. One number of 3 way momentary ON type (spring return) switch for cylinder (D) up and down and Hold function.	
5.Supply, laying and end termination (with ferrule numbering) of required size of Power and control cable with copper conductor in flexible metallic hose (PVC overlapped) for the motor, hydraulic valves, control	

elements shall be done by the supplier.	
Important aspects of the specification adherence should be declared during offering.	
1. The period of supply & commissioning should be 6 weeks.	
2. The supply should be direct, not through bank.	
3. All hydraulic valves & pumps are as per spec.	
4. Declaration of site visit and acquaintance.	
5. Payment will be raised after installation and commissioning.	
6.0 NOTE:- **Solenoid operated direction control valve for each cylinder operation with manifold is to be selected and supplied with the power pack. The power pack should contain appropriate check valves, pressure relief valves, filters, stainers, erc.. are to be provided.**	
7.0. General points:	
(1) Input power supply of 415v, 3 ph, 3 wire, 50 Hz with isolator will be provided by BHEL.	
(2) The control panel should be of self standing type.	
(3) The electric motor shall be of Kirloskar / ABB / Siemens make conforming to S1 – continuous duty with IP-55 protection.	
(4) All electrical components in control panel / operating panel should be of reputed makes of Siemens / L&T / Telemechanic only.	
(5) All proximity sensors should be of reputed makes like Technic / Jayshree.	

(6) The operating panel should have sufficient aesthetic appearance and ergonomic to normal operation.	
(7) All electrical terminations to be provided with suitably sized cable glands.	
(8) The power pack and all connected materials are to be selected in accordance with IS 10481-2002 /ISO 4413-1998.	
(9) The power pack shall be fitted with lifting hook for easy movement.	
(10) **Supplier shall visit the site and see the existing facility for complete clarity in understanding of our system requirements before submission of offer.**	
(11) It is the responsibility of vendor to erect and commission the above system with sufficient manpower, tools & tackles and required fasteners.	
(12) BHEL shall provide all the civil work if required. Necessary power, water, compressed air and any machining required at site will be provided by BHEL free of cost.	
(13) Supplier shall quote for materials supply and erection work separately.	
(14) The fixing of cylinder with the pull out machine and base, hydraulic hoses, tubes & fittings from cylinders to the power pack with the regulating valves are to be fastened and clamped properly in order to avoid in between looseness, vibration, clamping failures, etc..	
8.0. Documents to be provided along with offer for technical evaluation:	
The following documents to be provided along with offer for technical	

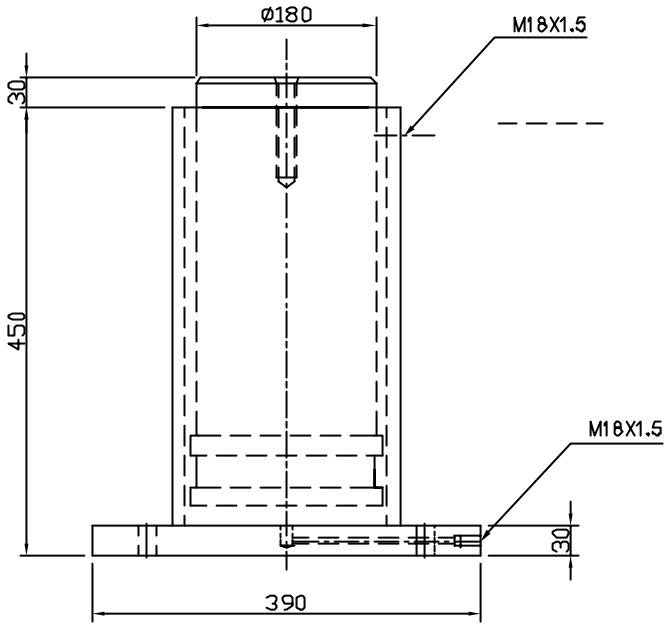
evaluation. In the absence of all the required documents, the offer will not be considered.	
(1) Hydraulic circuit with Bill of materials giving complete purchase specifications and make of each item.	
(2) Technical catalogues of pump, seals, valves and fittings.	
(3) Cross sectional assembly drawing of cylinder with major and mounting dimensions.	
(4) Details of sealing arrangement and proposed seal make and part no.	
(5) Electrical schematic and control circuit diagram with complete bill of materials including makes of each components in it.	
9.0. Documents to be provided for approval before manufacturing:	
In case of ordering, the supplier should provide the following documents for our approval before manufacturing.	
(1) Hydraulic circuit with Bill of materials giving complete purchase specifications and make of each item.	
(2) Cross sectional assembly drawing of cylinder with complete dimensions and sealing arrangements.	
(3) Electrical schematic and control circuit diagram with complete bill of materials including makes of each components in it.	
(4) Electrical wiring diagram with ferrule numbers.	
(5) Control panel lay-out.	
10.0. Documents to be supplied along with material supply:	
Three sets of the following documents are to be provided along with each power pack (Both hard copy and Soft copy-CD):	
1. Hydraulic Circuit (preferably with standard coloring) with Bill of materials giving purchase specifications for each item.	

2. Function diagram for the entire operations of the system giving solenoid sequences, interlocks and pressure & flow parameters for each operation.	
3. List of rubber items like O-rings, Piston / rod seals, wipers, etc. with complete purchase specification.	
4. Pump lay out and piping lay out giving sizes of each pipe line.	
5. Cross sectional assembly drawing for all the cylinders giving major dimensions, seal details, mounting details, pressure ratings, etc.	
6. Detailed technical Catalogues in original for all components in the system.	
7. Electrical schematic/ control circuit diagram with Bill of materials giving complete purchase specification of all bought out components.	
8. Electrical wiring diagram with ferrule numbers.	
9. Control panel lay-out.	
11.0. Testing and Inspection:	
1. The power pack will be tested at supplier's works for the operating parameters.	
2. The cylinder will be tested at supplier's works by the Indenter before despatch for the test pressure of 315 bar for a holding time of minimum 15 minutes at both ends for leak free sealing.	
3. The test certificate for the hardness and chrome plating thickness to be produced.	
4. The supplier should provide all the facilities for testing at suppliers work and prove the performance of the power pack and cylinders.	

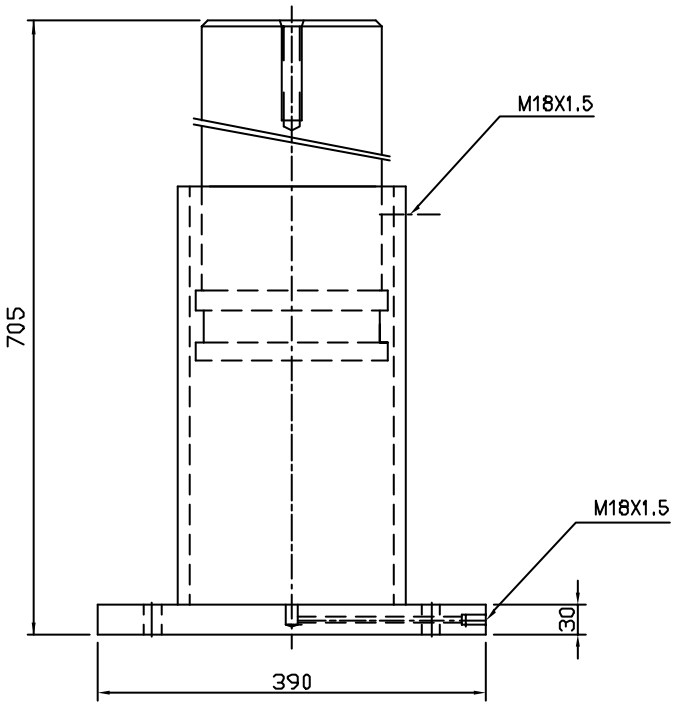
Qty Required:	
(A) 1 No of Power pack (including all pipe lines and hoses complete set)	
(B) 2 Nos. of A1 & A2 cylinders of stroke (Drg.No. 3-M-02-F37-12797) piston dia 203 mm, Piston rod dia 180 mm, stroke length 225 mm. Height of cylinder is 452 mm. The pre-projected length of piston is 28 mm for tool mounting, foot mounted non-standard.	
© 1 No. of cylinder (B) piston dia 100 mm, rod dia 45mm stroke length 2000 mm being operated by 6 bar air equivalent to hydraulic cylinder is required with stroke length constant with front side flange mounting.	
(D) 1 No. of cylinder (C) piston dia 100 mm, rod dia 45mm stroke length 2000 mm being operated by 6 bar air equivalent to hydraulic cylinder is required with stroke length constant with front side flange mounting.	
(E) 1 No. of cylinder (D) piston rod dia 100 mm rod dia 45mm stroke length 120 mm being operated by 6 bar air equivalent to hydraulic cylinder is required with stroke length constant with front side flange mounting. The cylinder rod pre-projected length is about 250 mm.	

NOTE : VENDOR SHALL FURNISH COMPLETE DETAILS IN THE FORMATE POINT TO POINT CONFIRMATION .

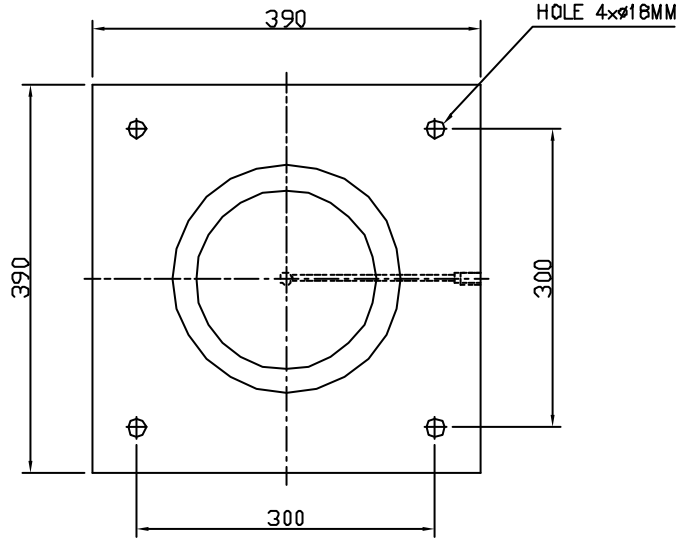
ALL DIMENSIONS ARE IN MM



CLOPSED CYLINDER



WITH FULL STROKE



NOTE:

WORKING PRESSURE 250Kg/Cm^2

STROKE LENGTH : 225 MM

ROD Ø180

FULLY RETRACTED CONDITION-480MM

No.of Pieces	DESCRIPTION	MATERIAL	STANDARD	NET.WT.IN KGS.	DRAWING No.	ITEM No.
	REFERENCE:		ALTERATIONS:	DCN REF / DATE / SIGN.		INDEX
SCALE 1:5	DRAWN: GGR					
	CHECKED:					
	APPROVED:					
	DATE: 11-11-06					

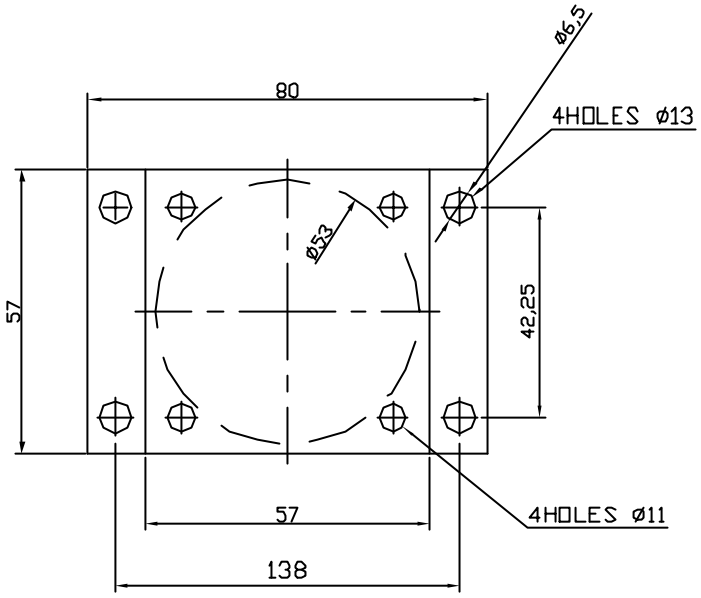
MACHINE: PRODUCTION FACILITY — TYPE: PULLOUT PRESS

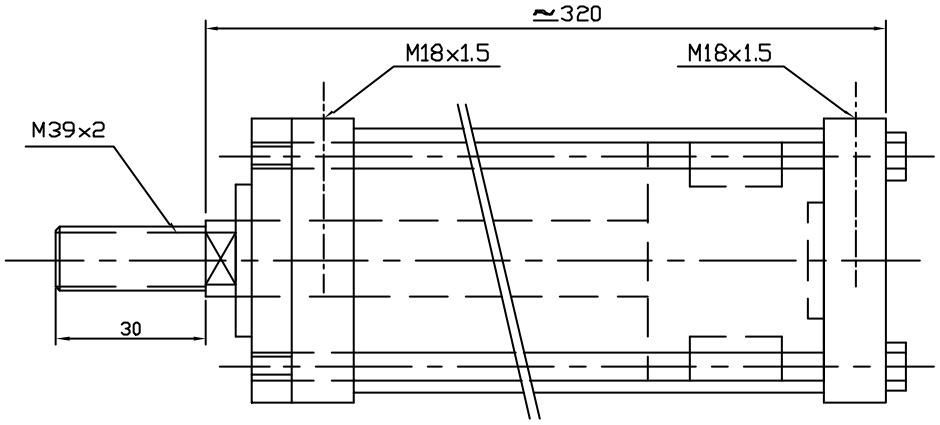
TITLE: HYD.CYLINDER ASSY.

DRAWING No: 3M02F3712797

Sheet No: — No.of Sheets:

ALL DIMENSIONS ARE IN MM





PISTON ø	ROD ø	STROKE LENGTH	WORKING PRESSURE	NO OF CYLINDER
100 MM	45 MM	150 MM	250Kg/Cm^2	1

No.of Pieces	DESCRIPTION	MATERIAL	STANDARD	NET.WT.IN KGS.	DRAWING No.	ITEM No.
	REFERENCE:		ALTERATIONS:	DCN REF	DATE / SIGN.	INDEX
SCALE 1:2	DRAWN: TTB					
	CHECKED:					
	APPROVED:					
	DATE: 01.12.06					

MACHINE: PRODUCTION FACILITY — TYPE: PULLOUT PRESS

TITLE:

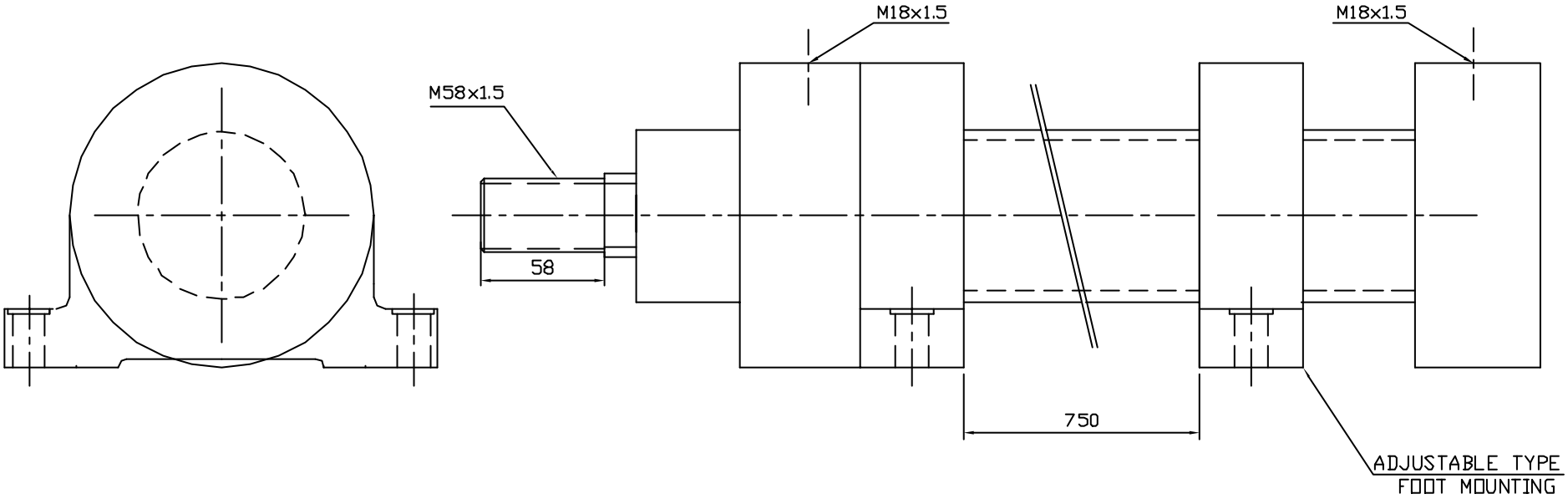
HYD CYLINDER

FLANGE MOUNTING AT CYLINDER HEAD

DRAWING No: 3M02F3712811

Sheet No: — No.of Sheets:

ALL DIMENSIONS ARE IN MM



PISTON ø	ROD ø	STROKE LENGTH	WORKING PRESSURE	NO OF CYLINDER
100 MM	70 MM	2000 MM	250Kg/Cm	2

No.of Pieces	DESCRIPTION	MATERIAL	STANDARD	NET.WT.IN KGS.	DRAWING No.	ITEM No.
	REFERENCE:		ALTERATIONS:	DCN REF	DATE / SIGN.	INDEX

SCALE 1:2	DRAWN	TTB
	CHECKED	
	APPROVED	
	DATE	01.12.06

MACHINE: PRODUCTION FACILITY
TYPE: PULLOUT PRESS

TITLE:
HYD CYLINDER
ADJUSTABLE FOOT MOUNTING

DRAWING No: 3M02F3712812

Sheet No: / No.of Sheets:

ALL DIMENSIONS ARE IN MM

12	PRESSURE HOSE		A3.1TOA3.6	
12	PRESSURE HOSE		A3.1TOA3.6	
01	PRESSURE HOSE			45
01	DRAN HOSE			44
01	CHECK VALVE	DT8P1-1D-30-11	VICKERS	43
12	FLOW VALVE	FT270/5-38	TOGNELLA	42
01	MANOMETER	KFG-200-063-250-5-1/4	AVS	41
01	Pr GAUGE ISOLATOR VALVE	FT29D-01-14	TOGNELLA	40
01	CHECK VALVE	DT8P1-1D-30-11	VICKERS	39
01	CHECH VALVE	DT8P1-06-3D-11	VICKERS	38
08	Pr GAUGE CONNECTION	SMK20G1/4"PC	STAUFF	37
12	SEQUENCE VALVE	SCCA-LAN	SUN	36
02	SUB PLATE HD			35

02	DIVIDING MOTOR	PN205-57-B	MASINO	34
04	BODY	ECU	SUN	33
04	COUNTER BALANCE VALVE	CBV1-12-S-DS--D4G-A50	VICKERS	32
01	PRESURE RELIEF VALVE	ECT-06F-1DTB		27
01	4/2 DIRECTIONAL CONTROL VALVE	4DGV-3S-2B-MU-H7-60	VICKERS	26
01	SUB PLATE ST			25
02	4/3 DIRECTIONAL CONTROL VALVE	4DGV-3S-2C-MU-H7-60	VICKERS	24
01	SUB PLATE HD			23
12	PLUG			22
01	4/2 DIRECTIONAL CONTROL VALVE	4DGV-3S-8B-00-MU-HH7-60	VICKERS	21
01	PRESURE RELIEF VALVE	DGMC-3-PT-GW	VICKERS	20
01	OIL LEVEL GAUGE		STAUFF	18
01	AIR FILTER	FC2013N010-P050	FINN-FILTER	17
01	MANGNET OPERATED OIL LEVELSWITCH			16
01	EL.INDICATOR		BOSCH	15
01	RETURN FILTER		BOSCH	14
01	CHECK VALVE	DT8P1-06-30-11	VICKERS	13
01	COUPLING			12
01	BELL HOUSING		KTR	11
01	DAMPING RAIL			10
01	E.L.MOTOR	M2BA180L4A22KWB35 1500RPM/400/50	ABB	09
01	AXIAL PISTON PUMP	FD183V-45CM V_g-2.7 P210/BAR	BOSH	06
01	FRAME			04
01	MANDLE			03
01	PLATE			02
01	RESSERVIOR			01

DESCRIPTION	MATERIAL	STANDARD	NET.WT.IN KGS.	DRAWING No.	ITEM No.

REFERENCE:

ALTERATIONS:	DCN REF	DATE	SIGN.	INDEX

DRAWN	MKV	
CHECKED		
APPROVED		
DATE	24-11-08	

MACHINE: PANEL PROCESSING MACHINE TYPE: PPM

TITLE:

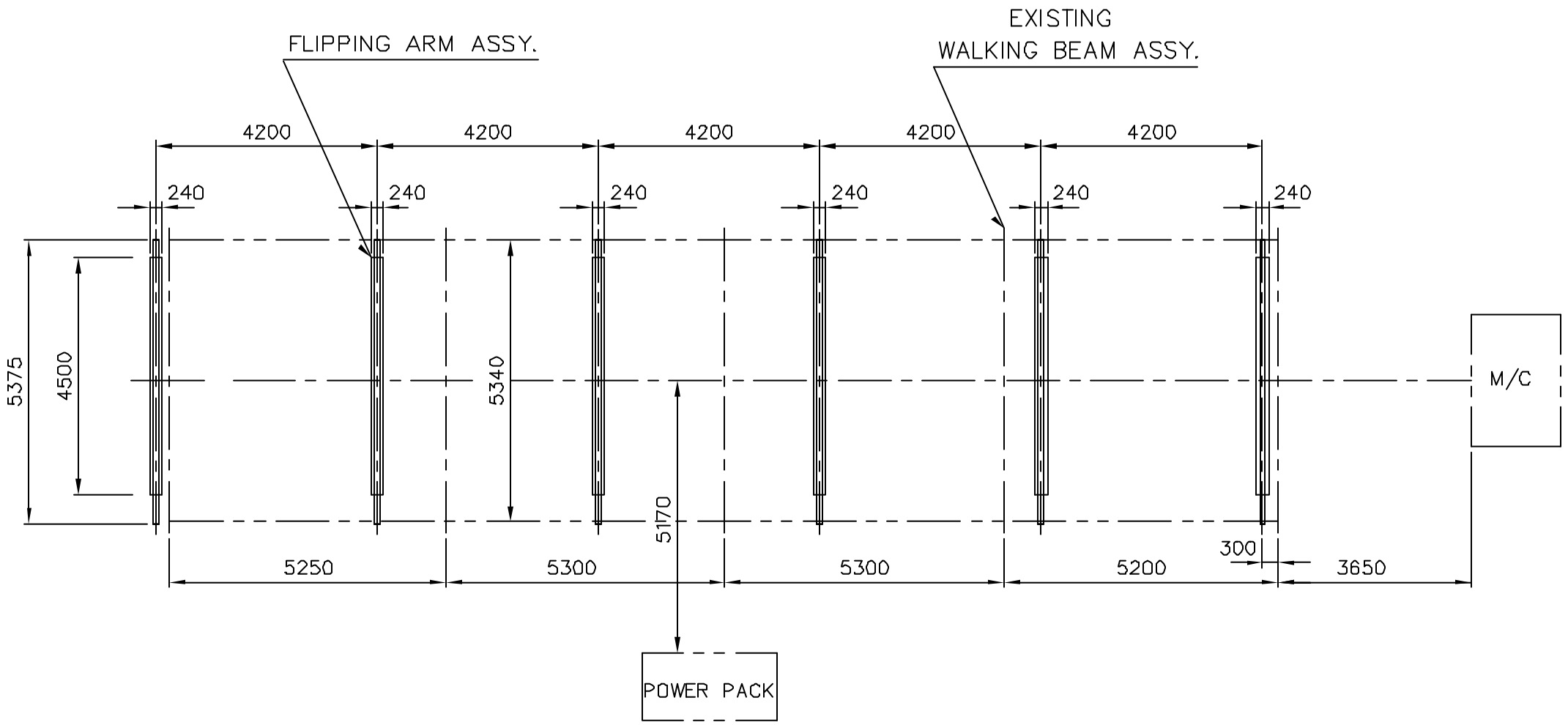
HYDDRAULIC CIRCUIT

(MATERIAL LIST)

DRAWING No: 3M10A131279 5 REV.

ALL DIMENSIONS ARE IN MM

ø50H7	+0.025 / +0.000	3.2 / 1.6 / ✓



No.of Pieces	DESCRIPTION	MATERIAL	STANDARD	NET.WT.IN KGS.	DRAWING No.	ITEM No.
	REFERENCE:		ALTERATIONS:	DCN REF	DATE / SIGN.	INDEX
SCALE 1:20	DRAWN GGR					
	CHECKED					
	APPROVED					
	DATE 13/11/06					

MACHINE: PRODUCTION FACILITY

TYPE: PLWD/PPM

TITLE:

FLIPPING ARM LAYOUT

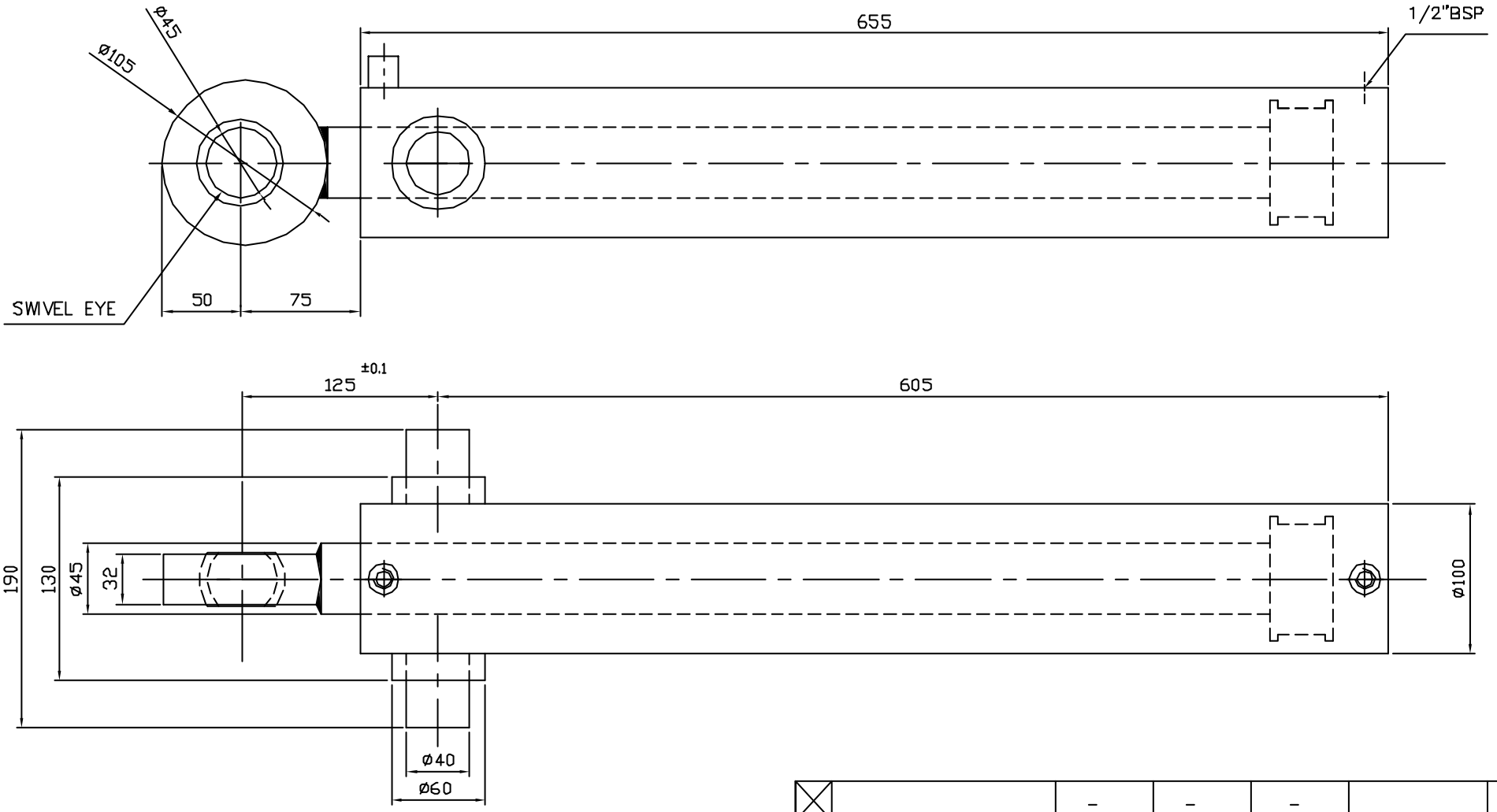
DRAWING No: 3M02F1312798

REV.

Sheet No:

No.of Sheets:

ALL DIMENSIONS ARE IN MM



PISTON ø80
PISTON ROD ø45
STORKE LENGTH 500MM
WORKING PRESSURE 210 BAR
TEST PRESSURE: 315 BAR
FULLY RETRACTED CONDITION

No.of Pieces	DESCRIPTION	MATERIAL	STANDARD	NET.WT.IN KGS.	DRAWING No.	ITEM No.
		-	-	-		

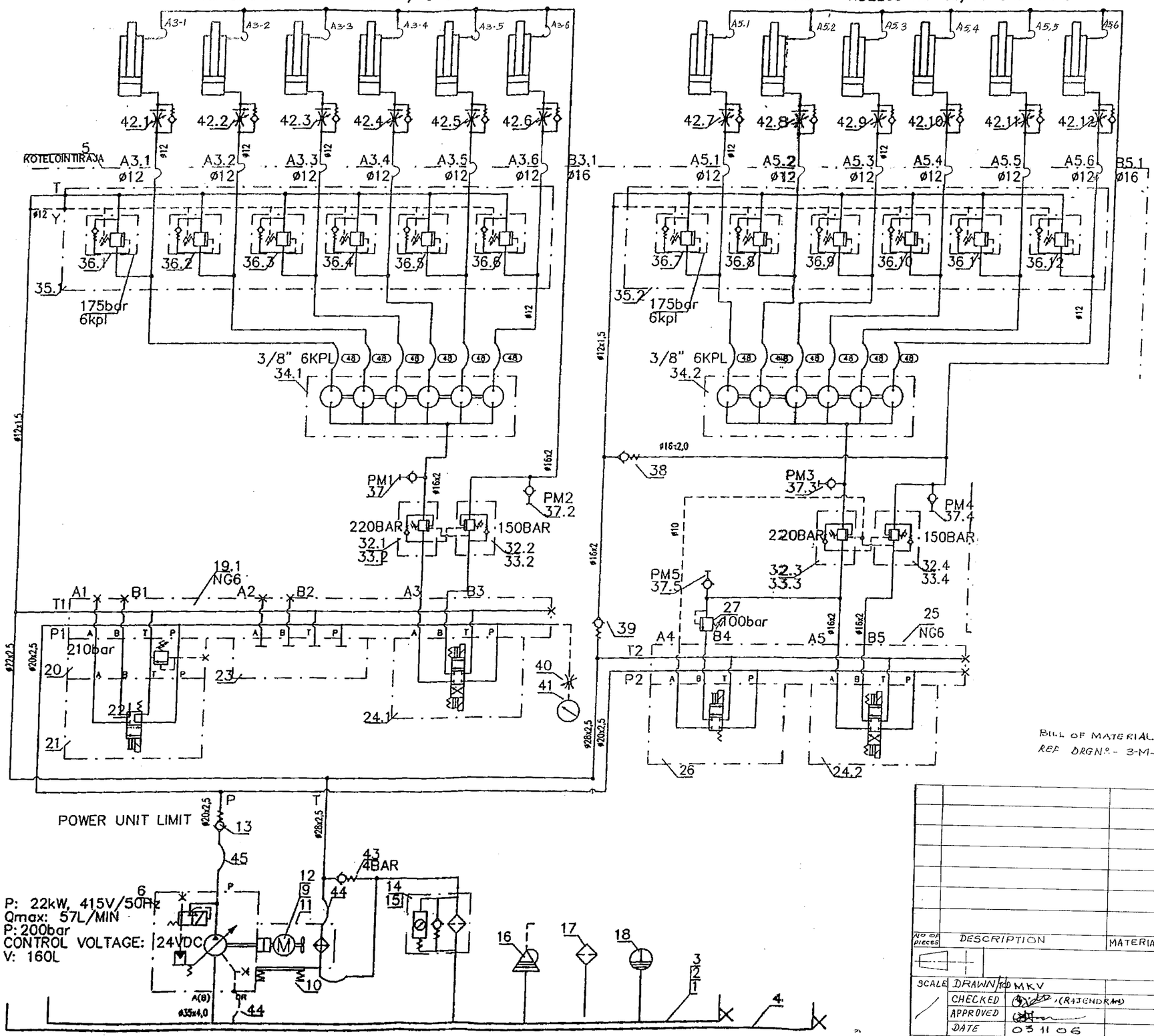
REFERENCE:	ALTERATIONS:	DCN REF	DATE	SIGN.	INDEX

SCALE		
1:4	DRAWN	(JJM)
	CHECKED	
	APPROVED	
	DATE	12.11.2006

MACHINE: PRODUCTION FACILITY
TYPE: PLWD/PPM
TITLE:
MALE TRUNNION HEAD MOUNTED
(HYD.CYLINDER)
DRAWING No: 3M02F1312799
REV.
Sheet No: Nos of Sheets:

REVERSION HD2205 TAP 80/45-500 6KPL

FRONT TABLE HD2205 TAP 80/45-500 6KPL



BILL OF MATERIAL LIST
REF DRGN.º - 3-M-10A13-12795

NO OF PIECES	DESCRIPTION	MATERIAL	STANDARD	NET. WT. IN KGS	DRAWING NO	ITEM NO. IN DEX

ALTERATIONS	DCN REF	DATE	SIGN.

SCALE

DRAWN MKV

CHECKED (RAJENDRAN)

APPROVED

DATE 03 11 06

BHEL

MACHINE PANEL PROCESSING MACHINE TYPE PLWD

TITLE HYDRAULIC CIRCUIT

DRAWING 2M10A13046645 REV.

Sheet No NO of sheets.