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ENQUIRY

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390690211 18-AUG-06 21-SEP-06 31-DEC-06

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PLEASE SUBMIT YOUR QUOTATION IN SEALED COVER SUPERSCRIBED WITH ENQUIRY NO, ENQUIRY DATE AND DUE DATE SUBJECT TO OUR TERMS AND CONDITIONS ENCLOSED, FOR THE FOLLOWING MATERIALS SO AS TO REACH US ON OR BEFORE THE DUE DATE BY 12 NOON. THE TENDERS WILL BE OPENED AT 2 PM ON THE SAME DAY

PLEASE GIVE REFERENCE OF ENQ NUMBER , ENQ .DATE AND DUE DATE IN ALL YOUR CORRESPONDENCE FOR PROMPT ACTION. IN CASE IF YOU ARE NOT MAKING THE OFFER PLEASE POST A REGRET LETTER AND RETURN THE DOCUMENTS.

SL NO	DESCRIPTION / SPECIFICATION	UNIT	QTY
1	PNEUMATICS HARDWARE & SOFTWARE. DETAILED TECHNICAL SPECIFICATION AS PER ANNEXURE A. BILL OF MATERIAL AS PER ANNEXURE B.	NO.	1

NOTE: PLEASE SUBMIT YOUR OFFER IN TWO PARTS AS PER THE ENCLOSED ANNEXURE "AA" IN SEPARATE SEALED COVERS AS DETAILED BELOW:

- 1) FIRST COVER CONTAINING TECHNICAL, COMMERCIAL AND UNPRICED PRICE BID ALONG WITH COMPLIANCE STATEMENT, MENTIONING APPLICABLE DUTIES, TAXES ETC., AND DELIVERY TIME CLEARLY.
- 2) SECOND COVER CONTAINING PRICE BID.
- 3) COMBINED BID OFFERS WILL BE REJECTED SUMMARILY.

AS WE ARE ENGAGED IN R&D ACTIVITY "C" FORM
WILL NOT BE ISSUED

Yours faithfully
for

PLEASE FILL UP THE ENCLOSED VENDOR
REGISTRATION FORM AND SEND IT ALONG WITH
YOUR QUOTATION. OTHERWISE YOUR QUOTATION
WILL NOT BE CONSIDERED. (IGNORE THIS IF YOU
HAVE ALREADY SUBMITTED THIS FORM)

BHARAT HEAVY ELECTRICALS LTD

PK Kakkar
Manager

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ANNEXURE-A

Specifications for Pneumatics Hardware & Software

I. Pneumatics Training Kit Basic Level:

The Pneumatic Training Kit (Basic Level) shall be capable of being used to demonstrate the design, construction and application of pneumatic components and circuits.

The kit shall be capable of being used to demonstrate the following:

- Design and function of a pneumatic system – Basic.
- Function and identification of pneumatic components and their symbols.
- Direct and indirect manual controls, stroke dependant controls, time dependant with time delay valves. and pressure dependant controls with pressure sequence valves.
- Logic AND / OR function to start signals.
- Application and fault findings of pneumatic controls.
- Functional diagrams.
- Sequence Controls.
- Methods for the drafting of circuit diagrams for pneumatic controls.

The components shall be capable of being mounted on an appropriate profile plate with grooves for secure and flexible positioning so that the components can be clamped firmly, quickly & safely through quick fix adapters. This should ensure flexibility in conducting experiments through various exercises.

Pneumatic Plug in type flexible connectors shall be safe & airtight, usage for multiple applications. These shall be with precision quick connector for plastic tubing 4 mm x 0.75 and for internal or external diameter calibrated tubes. (Unless specified against individual item).

Good quality tubing in different colors shall be provided for greater clarity in training.

Industrial components shall be used in the kit so that the students get hands on practical training in using industrial components.

The kit shall be modular and upgradeable so that future investments to higher levels of training are reduced.

The Basic Pneumatic kit shall contain components as per the list below.

Basic Pneumatic Kit: Component List

1. Profile plates & stand:

The anodized aluminum profile plate is the basis for all Festo Didactic training packages. All of the components fit securely and safely onto the profile plate. Both sides have grooves and, if required, both sides can be equipped. The grooves are compatible with the ITEM profile system. Side caps included.

Grid dimensions _____ 50 mm

Size _____ 1100 x 700 mm

For installation on tables we recommend the appropriate rubber feet

2. 3/2-way valve with pushbutton actuator N.C. assembly.

Design directly actuated, one side, with return spring

Pressure range _____ (-0.9 – 8 bar)

Nominal flow rate 1...2 _____ 60 l/min

3. 3/2-way valve with pushbutton actuator N.O. assembly.

Design – directly actuated, one side, with return spring

Pressure range _____ (3.5 – 8 bar)

Nominal flow rate 1...2 _____ 120 l/min

4. 5/2-way panel mounted valve assembly.:

The valves are actuated by rotating the selector switch. When the selector switch is released, the current circuit state is retained.

Design – Directly actuated, one side, with return spring

Pressure range _____ (0 – 8 bar)

Nominal flow rate 1...2 _____ 95 l/min

5. Pressure gauge assembly.:

The pressure gauge shows the pressure in pneumatic control circuits.

Design _____ Bourdon tube pressure gauge

Display range _____ (0 – 16 bar)

6. Quick-exhaust valve assembly.:

Quick-exhaust valve with built-in silencer.

Design _____ Poppet valve

Pressure range _____ (0.5 – 10 bar)

Nominal flow rate 1...2 _____ 960 l/min

Nominal flow rate 2...3 _____ 1100 l/min

7. 3/2-way roller lever valve, idle return N.C. assembly.:

The roller lever valve with idle return is actuated when the roller lever is traversed by the cam of a cylinder in a certain direction. After release of the roller lever, the valve is returned to its initial position by a return spring. When traversed in the reverse direction, the roller lever has an idle return and the valve is not actuated.

Design _____ Poppet valve, directly
actuated, one side, with return spring

Pressure range _____ (-0.9 – 8 bar)

Nominal flow rate 1...2 _____ 80 l/min

8. 3/2-way roller lever dir. Act. N.C. assembly.:

The roller lever valve is actuated when the roller lever is pressed, for example by the cam of a cylinder. After release of the roller lever, the valve is returned to its initial position by a return spring.

Design _____ Poppet valve, directly actuated,
one side, with return spring

Pressure range _____ (-0.9 - 8 bar)

Nominal flow rate 1...2 _____ 80 l/min

9. 5/2-way valve, pneumatically actuated, single sided assembly.:

The pneumatic single piloted valve is actuated by pneumatic signals, and following removal of the signal is returned to its initial position by a return spring.

Design _____ Directly actuated one side, with return
spring

Pressure range _____ (0 – 10 bar)

Nominal flow rate 1...2 _____ 500 l/min

Nominal flow rate 1...4 _____ 500 l/min

Response time _____ Optimum

10. Pilot valve, pneumatically actuated, dbl. sided, assembly.:

The pneumatic double pilot valve is reversed by pneumatic signals from alternate sides. The circuit state is retained after removal of the signal until the next counteracting signal.

Design _____ Directly actuated, both sides

Pressure range _____ (0 – 10 bar)

Nominal flow rate 1...2 _____ 500 l/min

Nominal flow rate 1...4 _____ 500 l/min

Response time - Optimum

11. Shuttle valve (OR) assembly.:

The shuttle valve is switched through to the output by applying compressed air to one of the inputs (OR function).

Design _____ OR gate (shuttle valve)

Pressure range _____ (1 – 10 bar)

Nominal flow rate _____ 500 l/min

12. Dual-pressure valve (AND):

The dual-pressure valve is switched through to the output by applying compressed air to both of the inputs (AND function).

Design AND gate (dual-pressure valve)

Pressure range _____ (1 – 10 bar)

Nominal flow rate _____ 550 l/min

13. Time-delay valve / adjust N.C. assembly.:

The time delay can be set with an adjusting screw (infinitely variable).

Design _____ Return spring

Pressure range _____ (2.5 – 8 bar)

Nominal flow rate 1...2 _____ 92 l/min

Delay _____ 5 s

14. One-way flow control valve assembly.:

The one-way flow control valve is a combination of flow control valve and a non-return valve. The cross-section of the restrictor can be set by means of a knurled screw.

Design _____ Combined flow control valve

Pressure range _____ (0.5 – 10 bar)

Nominal flow rate - 0 – 220 LPM

15. Pressure sequence valve assembly.:

The pressure of the control signal can be set by means of the pressure setting screw (infinitely variable).

Design _____ Poppet valve with return spring

Operating pressure range _____ (1.8 – 8 bar)

Control pressure range _____ (1 – 8 bar)

Nominal flow rate 1...2 _____ 100 l/min

16. Single-acting cylinder assembly.:

Design _____ Piston cylinder

Operating pressure _____ 10 bar

Stroke length _____ Maximum 50 mm

Thrust at (6 bar) _____ 169 N

Spring return force minimal _____ 13.65 N

17. Double-acting cylinder assembly.:

Design _____ Piston cylinder

Operating pressure _____ (10 bar)

Stroke length _____ Maximum 100 mm

Thrust at (6 bar) _____ 188.5 N

Return thrust at (6 bar) _____ 158.3 N

18. Manifold assembly.:

Manifold with six (2 x 3)self-closing non-return valves. A common manifold (QS-6) for plastic tubing allows supply of compressed air to the control via six Individual ports (QS-4 for plastic tubing PUN 4 x 0.75).

19. Filter regulator with gauge assembly.

Filter control valve with pressure gauge, start-up valve, quick push-pull connectors and quick couplings, mounted on a swivel support.

The filter with water separator removes dirt, pipe sinter, rust and condensed water.

The pressure control valve regulates the supply air pressure to the set operating pressure and compensates pressure fluctuations. The filter bowl has a condensate drain valve.

The start-up valve/shutoff valve ventilates and vents the entire control. The 3/2 way valve is actuated by a rotary button.

Design	Sintered filter
Nominal flow rate	750 l/min
Input pressure	Maximum (16 bar)
Output pressure	Maximum (12 bar)
Grade of filtration	40 µm
Condensate quantity	22 cm ³
Connector	G 1/8,

20. Pressure regulator valve with gauge assembly.

The pressure regulator valve with gauge regulates the supply air pressure to the set operating pressure and compensates pressure fluctuations.

Design	Diaphragm regulator valve
Nominal flow rate	800 l/min
Input pressure	(16 bar)
Working pressure	(12 bar)

Connection Component Set, various quick push-pull connectors- Connectors

21. Plastic tubing:

PUN 4 x 0.75	
Exterior diameter	4 mm
Interior diameter	2.8 mm
Metallic silver	10 m

22. T-connectors:

These shall be for branching of the tubes for making circuitry.

23. Connection component Set:

Spare sets of these connection components shall be supplied.

II. Electro Pneumatic Training Kit Basic Level:

The Electro Pneumatic Training Kit (Basic Level) shall be capable of being used to demonstrate the design, construction and application of Electro Pneumatic components and circuits. This kit shall upgrade from the Basic level kit.

The kit shall be capable of being used to demonstrate the following:

- Design and function of a Electro Pneumatic system – Basic
- Function and identification of Electro pneumatic components and their symbols
- Direct and indirect manual controls, stroke dependant controls, time dependant with time delay valves and pressure dependant controls with pressure sequence valves.
- Logic AND / OR function to start signals
- Application and fault findings of Electro Pneumatic controls
- Functional diagrams
- Systematic design of Electro Pneumatic Sequence Controls
- Methods for the drafting of circuit diagrams for Electro Pneumatic controls
- Pneumatic Power Section – Electric Control Section

The components shall be capable of being mounted on an appropriate profile plate with grooves for secure and flexible positioning so that the components can be clamped firmly, quickly & safely through quick fix adapters. This should ensure flexibility in conducting experiments through varies exercises.

Pneumatic Plug in type flexible connectors should be safe & airtight, usage for multiple applications. These should be with precision quick connector for plastic tubing 4 mm x 0.75 and for internal or external diameter calibrated tubes. (Unless specified against individual item).

Multifunctional electro – connectors for 4 mm laboratory plugs and jack plugs

Industrial components shall be used in the kit so that the students get hands on practical training in using Industrial components.

The kit shall be modular and upgradeable so that future investments to higher levels of training are reduced

The kit shall contain components as per the attached list.

1. Relay, three fold:

The device has three relays with terminals and two buses for power supply.

Contact set	4 change-over switches
Contact load	Maximum 5 A
Cut-off load	Maximum 90 W
Pick-up time	10 ms
Drop-off time	8 ms

2. Signal Input, electrical:

The device contains an illuminated pushbutton switch (control switch) and two illuminated pushbuttons (momentary contact switches) with terminals and two buses for power supply.

Contact set _____ 2 makes, 2 breaks

Contact load _____ Maximum 1 A

Power consumption (Miniature bulb) _____ 0.48 W

3. Indicator unit & distributor, electrical:

The device contains an acoustic indicator and four lamps with terminals and three buses for power supply. Through-contact socket pairs per lamp allow the element to also be used as a distributor.

Power consumption acoustic indicator _____ 0.04 W

Power consumption indicator lamps _____ 1.2 W

Frequency acoustic indicator _____ 420 Hz

4. Proximity Switch, electronic with cylinder attachment:

The proximity switch consists of a sensor, the mounting kit, and the cable. This proximity switch gives a signal when it detects a magnetic field. The status is indicated by an LED.

Switching voltage _____ 10 – 30 VDC

Switching current _____ Maximum 200 mA

Switching power _____ 6 W

Switch accuracy _____ ± 0.1 mm

5. 3/2 Solenoid valve, Single, with LED, NC:

The status is indicated by an LED on the housing. The valve is equipped with a manual override. The electrical connections feature polarity-reversal protection for the LED and the suppressor circuit.

Pneumatic technical data:

Design _____ Spool valve, pilot controlled,
with return spring

Pressure range _____ 250 – 800 kPa (2.5 – 8 bar)

Response time at 600 kPa (6 bar) _____ On: 20 ms, Off: 30 ms

Nominal flow rate 1...2 _____ 500 l/min

Electrical technical data:

Power consumption _____ 1.5 W

Duty cycle _____ 100 %

6. 5/2 way Single solenoid valve with LED

The status is indicated by an LED on the housing. The valve is equipped with a manual override. The electrical connections feature polarity-reversal protection for the LED and the suppressor circuit.

Pneumatic technical data:

Design _____ Spool valve, pilot controlled,
with return spring
Pressure range _____ 250 – 800 kPa (2.5 – 8 bar)
Response time at 600 kPa (6 bar) _____ On: 20 ms, Off: 30 ms
Nominal flow rate 1...2 and 1...4 _____ 500 l/min

Electrical technical data:

Power consumption _____ 1.5 W
Duty cycle _____ 100 %

7. 5/2 Solenoid valve, double, with LED:

The statuses are indicated by LEDs on the housings. The valve is equipped with two manual overrides. The electrical connections feature polarity-reversal protection for the LEDs and the suppressor circuits.

Pneumatic technical data:

Design _____ Spool valve, with pilot control
Pressure range _____ 150 – 800 kPa (1.5 – 8 bar)
Response time at 600 kPa (6 bar) _____ 10 ms
Nominal flow rate 1...2 and 1...4 _____ 500 l/min

Electrical technical data:

Power consumption _____ 1.5 W
Duty cycle _____ 100 %

8. Pneumatic – Electrical converter:

The pneumatic-electrical converter can fulfill 3 functions:
Pressure switch, vacuum switch, and differential pressure switch.

Pneumatic technical data:

Design _____ Prestressed metal bellows initiator
Pressure ranges:
Pressure switch, connector P1 _____ 25 – 800 kPa (0.25 – 8 bar)
Vacuum switch, connector P2 _____ -20 – -80 kPa (-0.2 – -0.8 bar)
Differential pressure switch:
connectors P1...P2 _____ -95 – 800 kPa (-0.95 – 8 bar)
Hysteresis _____ Maximum 25 kPa (0.25 bar)

Electrical technical data:

Switching current _____ 400 mA

9. Limit Switch, left actuated:

The electrical limit switch comprises a mechanically operated microswitch. When the roller lever is pressed, for example by the control cam of a cylinder, the microswitch is actuated. The circuit is closed or opened via the contacts. The microswitch can be wired as a normally-open, normally-closed or changeover contact.

Contact load _____ Maximum 5 A
Switching frequency _____ Maximum 200 Hz
Reproducible accuracy _____ 0.2 mm
Switch travel _____ 2.7 mm
Actuator force _____ 5 N

10. Limit Switch, right actuated:

The electrical limit switch comprises a mechanically operated microswitch. When the roller lever is pressed, for example by the control cam of a cylinder, the microswitch is actuated. The circuit is closed or opened via the contacts. The microswitch can be wired as a normally-open, normally-closed or changeover contact.

Contact load _____ Maximum 5 A
Switching frequency _____ Maximum 200 Hz
Reproducible accuracy _____ 0.2 mm
Switch travel _____ 2.7 mm
Actuator force _____ 5 N

11. Equipment Tray:

Plastic tray with matching slot for placing of the components to be supplied with the electro pneumatic supplementary kit.

12. Power Supply Unit:

Input voltage _____ 230/115 V AC (47 – 63 Hz)
Output voltage _____ 24 V DC, short-circuit-proof
Output current _____ Maximum 4.5 A
Connection cable _____ 1.3 m
Dimensions _____ 115 x 155 x 200 mm

13. Plug in adapter:

For mounting of components with plug-in foot on the aluminum profile plate.

14. Set of Cables:

Color	Quantity	Length [mm]	With 4 mm safety plugs
Red	1	1500	376 941
Red	3	1000	376 939
Red	21	500	376 937
Red	26	300	376 935
Red	10	50	376 932
Blue	1	1500	376 940
Blue	3	1000	376 938
Blue	12	500	376 936
Blue	11	300	376 934
Blue	10	50	376 931

15. Quick Push Pull connectors:

Sufficient shall be supplied for branching of the tubing for making of the circuitry.

III. Electro Pneumatic Training Kit with PLC (Basic level):

The Electro Pneumatic PLC Training Kit (Basic Level) shall be capable of being used to demonstrate the design, construction and application of Electro Pneumatic components and circuits. This kit should upgrade from the Electro pneumatic Basic level kit.

The kit shall be capable of being used to demonstrate the following:

- Design and function of a Electro Pneumatic PLC system – Basic
- Function and identification of Electropneumatic components and their symbols
- Direct and indirect manual controls, stroke dependant controls, time dependant with time delay valves and pressure dependant controls with pressure sequence valves.
- Logic AND / OR function to start signals
- Application and fault findings of Electro Pneumatic controls with PLC
- Functional diagrams
- Systematic design of Electro Pneumatic with PLC Sequence Controls
- Methods for the drafting of circuit diagrams for Electro Pneumatic with PLC controls
- Pneumatic Power Section – Electric Control Section

The components shall be capable of being mounted on an appropriate profile plate with grooves for secure and flexible positioning so that the components can be clamped firmly, quickly & safely through quick fix adapters. This shall ensure flexibility in conducting experiments through various exercises.

Pneumatic Plug in type flexible connectors should be safe & airtight, usage for multiple applications. These should be with precision quick connector for plastic tubing 4 mm x 0.75 and for internal or external diameter calibrated tubes (unless specified against individual item)

Voltage 24 V DC

Multifunctional Electro – connectors for 4 mm laboratory plugs and jack plugs

Industrial components shall be used in the kit so that the students get hands on practical training in using Industrial components.

The kit shall contain components as per the attached list.

1. Proximity Sensor, Inductive:

Proximity switch that detects the proximity of electrically conducting objects through a change in inductance and emits a signal. The proximity switch has a PNP output and is designed as a normally-open contact. A yellow LED indicates the status. The switch is protected against polarity reversal, overload and short-circuit.

Switching voltage	10 – 30 VDC
Nominal switching distance	4 mm (material S 235 JR)
Switching frequency	Maximum 800 Hz
Output function	Normally open contact, positive switching
Output current	Maximum 400 mA

2. Proximity Sensor, Capacitive:

Proximity sensor that detects the presence of any object by a change in capacitance and emits a signal. The proximity switch has a PNP output and is designed as a normally-open contact. A yellow LED indicates the status. The switch is protected against polarity reversal, overload and short-circuit.

Switching voltage	10 – 30 VDC
Nominal switching distance	4 mm
Switching frequency	Maximum 100 Hz
Output function	Normally open contact, positive switching
Output current	Maximum 200 mA

3. Proximity Sensors, Optical:

Proximity switch that responds to light signals and delivers an electrical signal. The switching distance can be adjusted by means of a potentiometer. The proximity switch has a PNP output and is designed as a normally-open contact. A yellow LED indicates the status. The switch is protected against polarity reversal, overload and short-circuit.

Switching voltage	10 – 30 VDC
Nominal switching distance	0 – 100 mm (adjustable)
Switching frequency	Maximum 200 Hz
Output function	Normally open contact, positive switching
Output current	Maximum 100 mA

4. PLC:

Power Supply: 24V DC

12 input (min.)

8 outputs (relay) (min.)

Programming language - ladder/ statement

Programming cable between PLC & PC.

Software (CD) for programming PLC.

5. Plug in adapter:

For mounting of components with plug-in foot on the aluminum profile plate.

6. T- piece with Quick Push Pull fitting:

Sufficient shall be supplied for branching of the tubing for making of the circuitry.

IV. Software for simulation of Pneumatic circuits:

The simulation software shall be available in separate pneumatic version for simulation of Pneumatics / Electro-Pneumatics circuits and should be suitable for teaching the fundamentals of automation. It must have the following general capabilities:

- Built-in educational videos on at least 10 to 12 different topics, which help to understand the fundamentals of Pneumatics and explain how different components work.
- Animations of internal working of different Pneumatic components.
- Facility to create presentations based on built-in templates, or to include slides from other Windows applications.
- Facility to connect and control external Electro-Pneumatic hardware components, with the help of hardware (see specification V below).
- Built-in software PLC, to construct complex controls, to control internal circuits or external hardware components, without using any programming language.
- Component photographs to help identify and explain every component in the library.

Circuit Simulation:

The following simulation features should be available as standard:

- Simulation of circuit symbols should be possible, so that even complex circuits can be drawn and simulated.
- The Pneumatics software must include Pressure sequence valves, Time delay valves, Piloted non-return valve, Steppers, Motors and Swivel drives, all of which should be possible to simulate.
- Symbols of direction control valves should be customizable so that they can be converted into a 2, 3 or 4 position valve, with any combination of actuation on either side.
- Pressurized lines and electrical connections carrying supply should be possible to highlight automatically with a choice of colors.
- The software should have the capability of automatically summarizing the bill of material of any circuit, with a drag and drop control. Similarly the software should provide a drag and drop control that automatically draws a timeline showing the relative motion of each selected component on a time scale for easier calculation of air / oil consumption in circuits.
- Step by step simulation of any circuit should be possible for easier understanding of component state changes and circuit function.

V. Hardware for controlling external Electro-Pneumatic devices:

Hardware necessary for controlling external electro-pneumatic circuits using the pneumatic simulation software, along with necessary data cables has to be supplied. A detailed diagram indicating how the hardware interfaces with the software running on PC and the electro-pneumatic circuit should be enclosed along with the technical offer.

VI. Work Station :

The workstation will be used for storing & mounting, pneumatic components used for designing pneumatic circuits. It shall be a stationary workstation with powder-coated steel frame and a sturdy 25 mm work surface. Workstation substructure with one or two drawer units having 4 or 5 steel drawers.

Useful depth: 700 mm, useful width: 375 mm, load up to 20 kg per drawer. Easy-gliding drawer system with differential rollers for quiet running and additional braking system, lockable, front lock, drawer fronts can be labeled. Suitable space for placement & mounting of air-compressor shall be available in the workstation

VII. Compressor for Work Station (VI above):

Pressure :	Max 8 Bar (800 kPa)
Free Air Delivery :	50 Lit/min
Reservoir Capacity:	25 Lit
Electric Motor:	220V, 50 Hz, 0.34 kW.

ANNEXURE-B

Bill of Material for Pneumatics Hardware & Software

I. Pneumatics Training Kit Basic Level:

Sl No.	Name of Component	Quantity
1.	Profile Plate with Stand	1
2.	3/2-way valve with pushbutton actuator N.C. assembly	3
3.	3/2-way valve with pushbutton actuator N.O. assembly	1
4.	5/2-way panel mounted valve assembly	1
5.	Pressure gauge assembly	2
6.	Quick-exhaust valve assembly	1
7.	3/2-way roller lever valve, idle return N.C. assembly	1
8.	3/2-way roller lever dir. Act. N.C. assembly	3
9.	5/2-way valve, pneumatically actuated, single sided assembly	1
10.	Pilot valve, pneumatically actuated, dbl. sided, assembly	3
11.	Shuttle valve (OR) assembly	1
12.	Dual-pressure valve (AND)	1
13.	Time-delay valve / adjust N.C. assembly	1
14.	One-way flow control valve assembly	2
15.	Pressure sequence valve assembly	1
16.	Single-acting cylinder assembly	1
17.	Double-acting cylinder assembly	2
18.	Manifold assembly	1
19.	Filter regulator with gauge assembly	1
20.	Pressure regulator valve with gauge assembly	1
21.	Plastic tubing (Mtrs)	10
22.	T-connectors:	10
23.	Connection component Set	2

II. Electro Pneumatic Training Kit Basic Level:

Sl No.	Name of Component	Quantity
1.	Relay, three fold:	1
2.	Signal Input, electrical	1
3.	Indicator unit & distributor, electrical	2
4.	Proximity Switch, electronic with cylinder attachment	2
5.	3/2 Solenoid valve, Single, with LED, N	1
6.	5/2 way Single solenoid valve with LED	2
7.	5/2 Solenoid valve, double, with LED	1
8.	Pneumatic – Electrical converter	1
9.	Limit Switch, left actuated	1
10.	Limit Switch, right actuated	1
11.	Equipment Tray	1
12.	Power Supply Unit	1
13.	Plug in adapter	1
14.	Set of Cables	10
15.	Quick Push Pull connectors	1

III. Electro Pneumatic Training Kit with PLC (Basic level):

Sl No.	Name of Component	Quantity
1.	Proximity Sensor, Inductive	1
2.	Proximity Sensor, Capacitive	1
3.	Proximity Sensors, Optical	1
4.	PLC	1
5.	Software (CD) for programming PLC	1
6.	Programming cable between PC & PLC	1
7.	Plug in adapter	8
8.	T- piece with Quick Push Pull fitting	10

IV. Software for simulation of Pneumatic circuits:

Sl No.	Name of Component	Quantity
1.	Software for simulation of Pneumatic circuits	1

V. Hardware for controlling external Electro-Pneumatic devices:

Sl No.	Name of Component	Quantity
1.	Hardware for controlling external electro pneumatic devices using pneumatic simulation software.	1 Set

VI. Work Station:

Sl No.	Name of Component	Quantity
1.	Stationary Workstation	1

VII. : Compressor for Work Station (VI above):

Sl No.	Name of Component	Quantity
1.	Compressor for Work Station	1
2.	Quick Coupling Socket/Plug & Tubing.	1 Set



BHARAT HEAVY ELECTRICALS LIMITED

CORPORATE R&D DIVISION, VIKAS NAGAR, HYDERABAD – 500 093, AP, India

Ph: 0091-40 – 23778474, FAX: 0091-40 – 23770698

General Terms and Conditions of Enquiry & Contract for the Purchase of Goods/ Services

1. The quotation and any order resulting from this enquiry shall be governed by these General Terms and Conditions of enquiry and contract for the supply of goods and the supplier quoting against this enquiry shall, unless specifically stipulates any different terms or conditions, be deemed to have read and agreed to the same.
2. Sealed quotations in double cover with tenderer's distinctive seal, superscribing enquiry number, date and due date are to be submitted so as to reach on or before due date & time, addressed to **Additional General Manager(MM), Bharat Heavy Electricals Limited, Corporate Research & Development Division, Vikasnagar, Hyderabad, Andhra Pradesh, India – PIN-500 093, India.**

In the case of **Two-part bid**, each inner cover shall clearly be labeled as a) **Technical & Commercial Bid** containing technical data/ drawings/ catalogues/ quality plans along with commercial terms and conditions & copy of the price bid with the price columns left blank (unpriced price bid), b) **Price bid** containing prices quotes. Installation and/or Commissioning charges shall be spelt out in absolutely lucid terms, taking into account total charges, rather than quoting vaguely, such as charges per man-day or charges per engineer per day etc. **If the price bid was found later to be different from the unpriced price bid in any way, the offer will be rejected summarily.**

3. **Tender/ Technical bid Opening:** Unless specified otherwise, tenders/ technical bids will be opened on appointed date and time as mentioned in the enquiry or as communicated changed date/time, if any, in the presence of such of those tenderers who may be present.
4. **Delayed/ Late Tender:** Tenders, which have been posted by registered post through the postal department in time before opening date but received after tender opening, shall be treated as regular tenders. Other tenders received after tender opening time shall be treated as late tenders and normally they may be rejected.
5. The Quotation should be free from overwriting and erasures. Corrections and additions, if any, must be attested. Supplier should indicate in the quotation dimensions (Size), weight, rate etc., in the metric system unless the enquiry calls for different unit.
6. **Validity of Quotation:** All quotations shall be kept open for acceptance for a period of ninety days from the date of opening of Tenders/ Technical bid and this shall be deemed to be an express condition of all quotations. The rate shall be quoted in both figures and in words.
7. In the case of Two-part bid, the vendor should furnish technical clarifications, if any, within stipulated time mentioned, failing which, it will be construed that the vendor is not interested in the tender and BHEL shall not consider the offer for further evaluation.
8. **Revision of Pricebid:** In the event of any bidder, after finalizing the technical specifications and scope of supply, opting to revise and submit their latest price bid, then BHEL reserves the right to open their original / previous price bid also while evaluating revised bid.
9. **Pricebid Opening:** Unless specified otherwise in the enquiry, the Price bids of technically qualified vendors shall be opened with prior intimation in the presence of such of those tenderers who may be present.
10. **Conformity to Specifications:** The material should be of the best quality and shall be conforming to our specification given in our enquiry. Unless otherwise agreed upon by BHEL, no payment shall be due by BHEL in respect of any sample. Offers without details of specifications/ applicable catalogues will not be considered and are liable to be rejected.
11. **Terms of Delivery:** All suppliers shall quote the lowest prices on ex-works and FOB/FCA basis. Foreign suppliers will also indicate their Indian agent's name and address with percentage of agency commission out of the quoted price, if any. Name and Address of the supplier's Bankers address should also be given. Indian suppliers for the indigenously manufactured/ imported stock shall quote on Ex-works /Free-on-Rail/Road /FOR-destination basis, indicating packing & forwarding charges, if any, separately.
12. **Taxes and Duties:** Unless specified otherwise in the enquiry, BHEL do not provide "C" or "D" Form as it is engaged in R&D. All Indian suppliers shall clearly mention Sales Tax/ VAT, Excise Duty, and Service Tax etc, if any, payable in addition to the quoted price and indicate applicable rates/ percentage, item-wise. It will be paid

only if Registration Number under State(TIN)/ Central Sales Tax or Service Tax is specifically mentioned in the Bill/Invoice. Vendors without a Sales Tax/VAT registration and applicable Service Tax registration will not be considered.

13. **Insurance:** Insurance will be arranged by BHEL in case of Ex-Works as well as FOB basis supplies.
14. **Terms of Payment:** Full payment will be made within 30 days after receipt, inspection and acceptance of the material (and where involved, Erection and commissioning of the material/ equipment at BHEL/Destination) by Crossed cheque and no Bank commission charges are admissible. The Cheque will be sent by registered post and BHEL is in no way responsible if loss occurs due to delay by postal authorities and cheques falling into improper hands or through forgery or fraud. Suppliers having RBI-SEFT-enabled accounts can seek payment through Electronic Fund transfer. For foreign suppliers, the preferred payment term will be on Sight Draft basis and bank charges inside India will be to BHEL account and outside India will be to supplier's account.
15. Suppliers shall quote competitive price and best delivery for all the items mentioned in the enquiry. BHEL reserves the right to reject partial quotations and to place order on overall landed cost basis. Correct date of effecting supplies in the event of an order should be indicated in the offer. If the supplier's quoted terms are different from BHEL standard payment terms, interest @10.5% per annum (or as indicated in the enquiry) will be loaded to the quoted prices for difference of payment period.
16. **Packing:** The supplier shall be responsible for the goods being properly and adequately packed so as to prevent any loss, damage or deterioration during transit and indicate packing charges, if any, separately.
17. **Part/ Split Ordering:** BHEL reserves right to Order part of the item/ quantity of the enquiry and split the order among qualified vendors.
18. In case the goods enquired are on Rate Contract basis with any other unit of BHEL, such fact should be clearly indicated in the quotation giving full particulars of Rate Contract number, validity and price and also your willingness to comply with order if placed against such Rate Contract. A true copy of Rate contract signed by the supplier should be sent with the quotation.
19. **Inspection:** On receipt, the goods shall be subjected to inspection and also test, if necessary, and our decision regarding the acceptability of the goods shall be final and binding on the suppliers.
20. **Consequences of Failure To Deliver:** The time stipulated for delivery of goods shall be deemed to be the essence of the contract and delivery must be completed within the stipulated date/s. In the event of supplier's failure to supply the goods by the stipulated date/s, BHEL shall be entitled to levy a penalty of ½% per week for the delayed no of weeks or part thereof for the undelivered portion of PO subject to a maximum of 10% total order value.
21. **Withdrawal from the Contract:** In case the supplier withdraws the quotation after its acceptance by BHEL or fails to supply the goods as per the terms and conditions of contract, or at any time repudiated the contract wholly or in part, BHEL shall be at liberty to cancel the Purchase Order and to recover from the supplier the extra cost and other loss incidental to the breach of contract on the part of the supplier.
22. **Guarantee/ Warranty certificate and Manufacturer's Test report:** Invariably in all cases where it is so stipulated, the supplier should furnish Guarantee/ Warranty certificate valid for a period of 18 months from date of supply or 1 year from the date of receipt, acceptance and commissioning(or more, if provide by oem) whichever earlier and manufacturer's Test report along with the goods, failing which, BHEL shall have the right to reject the goods.
23. All ferrous/ non-ferrous items shall be colour coded as per bureau of Indian standards/ or IS standards/ BHEL Standards.
24. **Recovery of Dues:** BHEL shall recover any amount due from the supplier or any amount outstanding to the credit of the supplier with BHEL R&D unit or any other BHEL unit(s) and/or by legal action.
25. **Arbitration & Forum for Legal Proceedings:** All disputes arising in connection with indigenous/ foreign supplies shall be settled through arbitration held at Hyderabad, AP, India and arbitration shall be appointed by Arbitration Tribunal of the Federation of Andhra Pradesh Chambers of Commerce and Industry, Hyderabad, AP, India. The Courts at Secunderabad/ Hyderabad, AP, India shall have jurisdiction in respect of any suit or other legal proceeding arising from or relating to this contract

The rights and remedies of BHEL stated in these General terms and conditions shall be in addition and supplemental to its rights and remedies under law and custom or usage of trade or business and shall in no way be deemed to limit, curtail, supercede or derogate from its said rights and remedies.



ANNEXURE “AA
BHARAT HEAVY ELECTRICALS LIMITED
CORPORATE RESEARCH & DEVELOPMENT DIVISION
VIKASNAGAR, HYDERABAD – 500 093. INDIA

MATERIALS MANAGEMENT DEPARTMENT
(Information for Technical & Commercial bids with general terms)

ENCLOSURE TO ENQ No:

DATE:

- a) Please indicate(_/) for applicable or (X) for not applicable against each clause of the enquiry
- b) Vendor shall confirm their compliance for applicable clauses (_/) in their offer without deviation.

1) Technical offer:-

- a) Vendors to confirm compliance to all points of specifications, attached if any. Deviations if any should be specified in the offer.
- b) Vendors shall furnish relevant technical Documents / Catalogues. Drawings and Quality plan duly taking care of Purchase Specification and Quality requirements along with their offer in duplicate for Purchaser’s review / Verification.

2) Two Part Bid:-

Vendor shall submit their offer in 2 parts.

2.1 Technical Bid:- Containing relevant technical data, drawings, catalogues, Quality Plan etc, along with Commercial Terms and Conditions and a copy of the price bid with the price columns left blank (unpriced price bid). If the price bid was found later to be different from the unpriced price bid in any way, the offer will be rejected.

2.2 Price Bid:- Containing the Price(s) quoted. Installation and or commissioning charges shall be spelt out in absolutely lucid terms taking into account the total charges rather than quoting vaguely such as charges as per man day or charges per Engineer per day etc.,

Technical bids will be opened on the due date of the enquiry or any other date fixed by BHEL. Further, vendor should furnish clarifications, if any, required within seven days after the same is sought by Purchaser. If no clarifications/reply received within 7 days, it will be construed that vendor is not interested in the tender and Purchaser will finalise tender accordingly. Price bids received on due date along with technical offers will be recorded and opened subsequently with due intimation to vendors after finalising of technical scope of supply.

These bids shall be submitted in separate sealed covers superscribing the nature of the offer (technical bid or price bid). BHEL Enq No. Due date etc.

Note: In case of non-compliance with the TWO_-PART-BID ie.. clause number 2 and subclauses 2.1 and 2.2. Purchaser reserves the right to summarily reject all such offers.

3) Delivery:-

Vendor shall confirm supply of materials as per the delivery schedule indicated in the enquiry.

4) Negotiations:-

Vendor shall quote competitive price and best delivery to avoid negotiations.

5) Commercial Terms & Conditions:-

Terms of Delivery:

- a) **Vendors shall clearly indicate terms of delivery Viz: Ex-Works/FOR Despatching station/FOR Despatching station FOR Destination/FOB port of loading/FAS Port of loading in their offer. If the terms of delivery is Ex-Works, then vendors shall clearly indicate the following:**
 - 1. Packing and forwarding charges.**
 - 2. Documentation / Handling charges if any**
 - 3. FOB FAS charges (Inland Freight & Insurance charges from vendor works to port of Loading).**
- b) **All Indian Vendors shall clearly specify the Excise Duty in percentage applicable for their supplies. Offers containing expressions such as “Extra as applicable” or “As applicable at the time of Delivery” will be summarily rejected.**
- c) **CST/Local Sales Tax in percentage shall be clearly indicated.**

6) Validity of Quotation:-

Validity of offer should be 90 days after the opening of price bid.

7) Part or split ordering:-

Purchaser reserves the right to order part of item / quantity of the enquiry.

8) For clauses not mentioned in this document see the enclosed “GENERAL TERMS AND CONDITIONS OF ENQUIRY AND CONTRACT FOR THE PURCHASE OF GOODS”

- 9) In case your terms of payment are different from our standard payment terms, interest at the rate of 10.5% per annum (or BHEL’s standard rate of interest) will be loaded to your prices for the difference of period of payment.**



BHARAT HEAVY ELECTRICALS LIMITED
CORPORATE R&D Division
Vikasnagar, Hyderabad – 500093, India.

Suppliers' compliance statement to basic conditions of enquiry

(In case Order to be placed on Indian supplier in Indian currency)

Condition	BHEL R& D's terms	Supplier's compliance (indicate Yes/No. if 'No', state terms desired)
1) Validity of offer	90 days from the tender opening date	
2) Delivery requirements	Free delivery at our stores or FOR destination (as indicated in the enquiry)	
3)Warranty	Unless specifically mentioned in the enquiry, all supplied items to be provided with warrantee for one year (or more, if provided by the OEM) from the date of acceptance/commissioning. In case of equipment involving erection and commissioning, warrantee shall be for 18 months from the date of dispatch or 12 months from the date of commissioning, whichever is earlier	
4) Terms of payment	Full payment will be made within thirty days after receipt, inspection and acceptance of the material at BHEL R&D (and where involved, erection and commissioning of the material/equipment at BHEL/destination), by Crossed Cheque and no Bank commission charges are admissible.	
5) Taxes & Duties	Unless specifically mentioned in the enquiry, we do not provide 'C' or 'D' form. Supplier to specify rates of taxes and duties element wise and related percentages.	
6) Penalty for late delivery	0.5% per week beyond the delivery date as mentioned in the Purchase order on undelivered portion subject to a maximum of 10% of the total order value	

* BHEL R&D reserves the right to reject any offer due to non-compliance with the above conditions and/or non-receipt of this form in duly filled condition

* Any other elements of cost in addition to the above may please be specified in detail

(Signature and Stamp/Seal of Vendor)



BHARAT HEAVY ELECTRICALS LIMITED
CORPORATE R&D Division
Vikasnagar, Hyderabad – 500093.

IMPORTED

Suppliers' compliance statement to basic conditions of enquiry

(In case Order to be placed on the Principal and foreign currency)

Condition	BHEL R& D's terms	Supplier's compliance (indicate Yes/No. if 'No', state terms desired)
01) Validity of offer	90 days from the tender opening date (or as per enquiry)	
02) Delivery requirements	FCA – Nearest International Airport (or as indicated in the enquiry)	
03) Warranty	Unless specifically mentioned in the enquiry, all supplied items to be provided with warrantee for one year (or more, if provided by the OEM) from the date of acceptance/ commissioning. In case of equipment involving erection and commissioning, warrantee shall be for 18 months from the date of dispatch or 12 months from the date of commissioning, whichever is earlier	
04) Terms of payment	Sight draft. All bank charges inside India will be to BHEL R&D account and out side India will be to suppliers account. Documents through State Bank of India, HAL Complex, Balanagar, Hyderabad, AP, India-500 042.	
05) Agency commission	Pl specify percentage charges, if any. Indian agency/agent commission will be in Indian Currency only.	
06) Erection/ Commission	As per enquiry	
07) Documentation	As per enquiry	
08) Insurance	BHEL will arrange Insurance based on intimation to our Insurance agency, United India Insurance Co., DO-2, Secunderabad, AP, India.	
09) Penalty for late delivery	0.5% per week beyond the delivery date as mentioned in the Purchase order on undelivered portion subject to a maximum of 10% of the total order value	

* BHEL R&D reserves the right to reject any offer due to non-compliance with the above conditions and/or non-receipt of this form in duly filled condition

* Any other elements of cost in addition to the above may please be specified in detail

(Signature and Stamp/ Seal of Vendor)



BHARAT HEAVY ELECTRICALS LTD.
Corp. R&D DIVISION
VIKAS NAGAR,
HYDERABAD-500 093 (INDIA)

VENDOR REGISTRATION FORM

[FORM TO BE SUBMITTED* BY THE BIDDER ALONG WITH TECHNICAL-BID]

Before filling please refer to instructions on page-4

1.0 VENDOR PROFILE:

1.1 & 1.2 Name and address of the vender:

Phone Nos.:

Fax No.:

Email:

1.4 Local representative of the vender in India/ Hyderabad:

Phone Nos.:

Fax No.:

Email:

Contact person:

Mobile No.:

2.0 & 2.1 Type of Organisation:

PROPRIETORSHIP	COMPANY	SISTER CONCERN	ANY OTHER (Please specify)
PARTNERSHIP	CORPORATION	Small Scale Industry	

3.0 Annual Turn Over:

Name and address of the Banker:

Sr.No.	Bank	Address

4.0 REGISTRATION PARTICULARS

4.1 IT Permanent Account No.(PAN):

4.2 & 4.3 State and central sales tax Registration No.:

4.4 ED/ Service Tax Registration No.:

PF Account No.:

Labour Licence No.:

ESI Account No.:

5.2 Contact person:

Mobile No. :

5.3 Total Number of employees:

Graduates (Engr./Scientists/Mgmt/Fin.)	Consultants	Workers		
		Sup./Skilled	Semiskilled	Unskilled

6.0 Wish to register for supplies/ services other than one bidding for :

<u>Sr.No.</u>	<u>Service/Supplies</u>	<u>Capacity</u>
<u>1</u>		
<u>2</u>		
<u>3</u>		
<u>4</u>		
<u>5</u>		
<u>6</u>		
<u>7</u>		

6.1 Reference list :

(Only recognized public and private sector companies, attach if printed copy available)

<u>Sr.No.</u>	<u>Customer</u>	<u>Volume / Year</u>
<u>1</u>		
<u>2</u>		
<u>3</u>		
<u>4</u>		
<u>5</u>		
<u>6</u>		
<u>7</u>		

7.0 & 8.0 Infrastructure / facilities :

<u>Sr.No.</u>	<u>Facility (with specifications)</u>	<u>Age/ Year procured</u>
<u>1</u>		
<u>2</u>		
<u>3</u>		
<u>4</u>		
<u>5</u>		
<u>6</u>		
<u>7</u>		
<u>8</u>		
<u>9</u>		
<u>10</u>		

9.0 Registration with other BHEL Unit/Units:

<u>Sr.No.</u>	<u>9.1.1 Unit</u>	<u>9.1.2 Registration No.</u>
<u>1</u>		
<u>2</u>		
<u>3</u>		
<u>4</u>		

Any Other information :

Declaration:

The information furnished above is true and authentic.

(CEO / Proprietor)

SEAL:

Date:

The competent authority reserves the right to accept or reject the registration. Registered vendors will be informed by mail / email, as convenient. Contact Sr.DGM (MM) for clarification/ additional information on registration.
A separate communication will be sent to you in case of non-registration, citing reasons thereof.

Instructions

1. Answer all items, use NA for items not applicable.
2. BHEL units do not require this registration.
3. Submit the form in duplicate.
4. Use additional sheets for want of space if required.
5. Attach copies of latest documents in respect of items 4.0 (Registration no.s)
6. Photographs of registered office and the chief executive/proprietor shall be furnished.
7. Use A4 sheets for this document and the enclosures.

* REGISTERED BIDDERS, HAVING BHEL (R&D) REGISTRATION NO./ HAVE SUBMITTED THIS FORMAT EARLIER, NEED NOT FURNISH THIS INFORMATION SECOND TIME (UNLESS DESIRE TO UPDATE IT).



BHEL CORPORATE R & D
VIKAS NAGAR- HYDERABAD - 500 093
ANDHRA PRADESH – INDIA
SUPPLIER REGISTRATION FORM

(FOREIGN SUPPLIER)

ALL COLUMNS SHOULD BE PROPERLY FILLED IN THE SPACE PROVIDED FOR. WHEREVER IT IS NOT APPLICABLE PLEASE WRITE “NOT APPLICABLE”. INCOMPLETE OR INCORRECT FORMS MAY NOT BE CONSIDERED.

1.0 GENERAL INFORMATION:

1.1....NAME OF COMPANY

1.2....DETAILS OF HEAD OFFICE:

ADDRESS :
TELEPHONE :
FAX :
.EMAIL :
.WEB SITE :

1.3....DETAILS OF FACTORY/WORKS:

ADDRESS :
TELEPHONE :
FAX :
.EMAIL :
.WEB SITE :

1.4....DETAILS OF MARKETING AGENT

ADDRESS :
TELEPHONE :
.FAX :
.EMAIL :
.WEB SITE :

1.5 CHIEF EXECUTIVE

NOTE: PLEASE ATTACH SEPARATE SHEETS, IF SPACE FOUND IS INADEQUATE

AUTHORISED SIGNATORY



BHEL CORPORATE R & D
VIKAS NAGAR – HYDERABAD – 500 093
ANDHRA PRADESH – INDIA

SUPPLIER REGISTRATION FORM

(FOREIGN SUPPLIER)

- 1.6 CONTACT PERSON(S)
FOR PRODUCT OFFERED
NAME(S)
OFFICIAL CAPACITY
ADDRESS:
TELEPHONE
FAX
E-MAIL
- 1.7 YEAR OF ESTABLISHMENT
- 1.8 PRODUCTION CAPACITY PER ANNUM
- 1.9 PARTICULARS OF PRODUCT INCLUDING
SPECIFICATION AND RANGE OFFERED
FOR REGISTRATION
(ATTACH BROCHERS AND CATALOGUE)
- 1.10 NAME(S) OF BANKERS
- 1.11 BANKER'S CERTIFICATE
- 1.12 PORT OF LOADING
- 1.13 NEAREST AIRPORT
- 1.14 NAME OF THE INDIAN AGENT, IF ANY
WITH AUTHORISATION LETTER
- 1.15 ANY OTHER INFORMATION:

AUTHORISED SIGNATORY



BHEL CORPORATE R & D
VIKAS NAGAR – HYDERABAD – 500 093
ANDHRA PRADESH – INDIA

SUPPLIER REGISTRATION FORM

(FOREIGN SUPPLIER)

2.0 FINANCIAL INFORMATION

2.1...TOTAL CAPACITY

2.2...ANNUAL TURN OVER FOR LAST 3 YEARS

2.3...WHEHER CREDIT LICENSE ACCEPTABLE YES/NO

3.0 QUALITY MANAGEMENT SYSTEMS
ENCLOSED FORMAT PART-B

3.1 EXPERIENCE LIST FOR SAME/SIMILAR ITEMS
TO BE ENCLOSED

4.0.....FUTURE EXPANSION PLANS:
(GIVE DETAILS)

5.0 LIST OF ENCLOSURES:
INCLUDING BROUCHERS, CATALOGUES, TECHNICAL
LITERATURE etc...

6.0 ANY OTHER INFORMATION

SIGNATURE OF SUPPLIER
NAME
DESIGNATION
DATE
.....OFFICIAL SEAL

AUTHORISED SIGNATORY
