

Detailed scope of work for relocation of control room and associated systems for HTPB reactor at PFC

1. INTRODUCTION& NEED OF THE ITEM

HTPB resin production plant at PFC is automated with PLC based control system. The existing control room is adjacent to the reactor and houses various control/electrical panels and SCADA station. In order to meet the space requirement as per safety norms, a new control room is constructed at an approx distance of 20m from the HTPB reactor and 40m from the existing control room.

It is proposed to shift all the control panels and SCADA operations from the existing to the new control room. It involves the shifting the existing control panels from existing room, disconnecting & removing existing cables, laying cables to the new location, installation and demonstration of the reconnected control systems, civil works for the cable trenches etc.

2. REQUIREMENTS

SCOPE OF WORK

- i. Dismantling of existing HTPB PLC panel, MCC panel, Butadiene storage system control panels, fire & gas detector panel, HTPB drying control panel, Deluge valve control panel (DVLCP) and IPA level indicating panels from the existing control room at C-14 building.
- ii. Relocation and installation of the HTPB PLC panel, MCC panel, and Butadiene storage system control panels, HTPB drying control panel, Deluge valve control panel (DVLCP) and IPA level indicating panel at new HTPB control room at building no C-33.

The layout for relocation is given in the Figure 1.

- iii. Installation of junction boxes (JB) at old control room for the relocation of above mentioned panels. The junction box shall be made of 14 SWG, CRCA sheet with anticorrosive treatment with seven tan treatments and shall be of dust and vermin proof construction and flexible baying options and virtually endless configurations, all based on a robust 16-fold tubular frame system with Gland plate at bottom portion.
- iv. The gasketed JB panel roof shall be secured with removable eyebolts that screw directly to the enclosure frame to seal out dirt and moisture.
- v. Work includes dismantling of existing control panel, flameproof remote control station, end terminations, disconnection of end joints, removing the existing control/power/sensor cable in trench/wall/pipe etc. Including removal of the fastening materials, rerolling of the removed

cables and returning the retrieved materials to the desired location as required and as directed by the Engineer-in-charge.

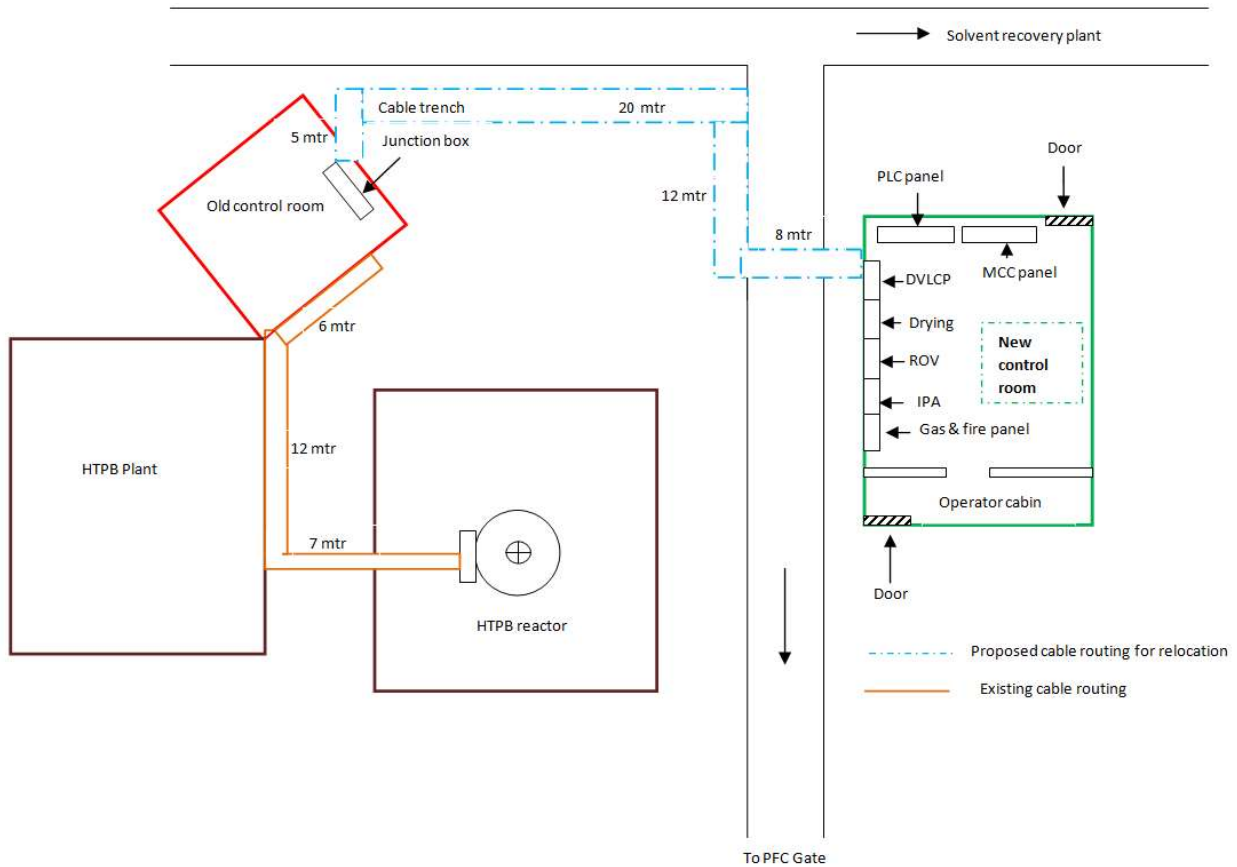


Figure 1. Layout for control panels relocation

- vi. Complete wiring for all power /control /sensor circuits in between all Junction boxes/motors /equipments /instruments and control panel shall be carried out with XLPE insulated PVC sheathed armored cables of adequate capacity as per IS 1554/Part I. The minimum size of the conductor used shall be of 2.5 sqmm copper for power cables.
- vii. Instrumentation cable should be twisted pairs with shielding and separated from power cables.
- viii. Laying of cable shall be in trench/on wall/floor/platform/structure, as per requirement, using suitable size GI pipe with necessary bunds, clamps, spacer etc including chipping and replastering wherever required, as directed by the Engineer-in-charge.
- ix. End termination of the cables including supply of all required materials such as double compression type flameproof cable gland/ordinary cable gland, identification tags and numbering ferrules, compression type lugs with terminal connections and earthing of glands shall be carried out.

- x. Necessary earthing work comprising of earthing of panel and electrical equipments/motors including interconnections with suitable size copper strip/wire with the existing earthing system shall be carried out.
- xi. All the civil works associated with shifting and re-routing of cables/ panels etc shall be taken care by the party.
- xii. Commissioning of the panels at new control room.
- xiii. Party shall be present at the site for immediate 5 batches of HTPB resin production after completion of the work.

3.0 DETAILS OF THE EXISTING CONTROL PANELS

3.1 HTPB PLC PANEL

This control panel is for accommodating PLC system for HTPB reactor. It consist of Siemens S71500 series standalone PLC SIMATIC S7-1500, I/O modules (AI-40, AO-8, DI-96, DO-64), power supply, push buttons for valves (~13 Nos.) , Auto-manual selector switch, UPS –Non- UPS selector switch, HMI, emergency power OFF button, Load cell indicator, PID controllers (~4 Nos.), indicators (~8 Nos.) etc. Panel size is 1600 x500 x 2000mm (L x W x H). The panel is also provided with UPS power supply.

SCADA WORK STATION

PC with SCADA software associated with PLC panel. The PC is connected to PLC panel, Butadiene level indicator panel, IPA level indicator panel and 50 TR Chilling plant, for getting real-time field inputs.

3.2 MCC PANEL

This panel is for the control of all motors associated with HTPB reactor. It includes the power supply to PLC panel and remote operation of motors (~10 Ns.). Panel size is 1800 x 500 x 2025 mm (L x W x H). The panel consists of following pumps and motors.

Sl. No.	Description	Power(kW)	Voltage(V)
1	Cooling water circulation pump	2.2	415
2	Butadiene gas transfer pump	2.2	415
3	Raw material charging pump	7.5	415
4	Hot water circulation pump	3.7	415
5	Mechanical seal pump	3.7	415
6	Agitator	15	415
7	Product discharge pump	2.2	415
8	Chilled water circulation pump	1.1	415
9	Lubrication pump	0.4	415

3.3 BUTADIENE YARD ROV PANEL

This panel is for the inlet and outlet control of the butadiene gas from three numbers of storage tanks. It consists of 8 Nos. of Remote operating pneumatic valve control (ROV's). The size of the control panel is 500 x180 x 580mm (L x W x H).

3.4 FIRE AND GAS DETECTOR PANEL

This panel is for the fire protection system of butadiene storage yard, it consist of 5 no's of gas sensors and 7 no's of fire sensors distributed in the butadiene storage yard. This panel also consist of butadiene gas level sensors and high level alarm for the 3 numbers of butadiene storage tanks. The size of the control panel is 600 x 300 x 1000mm (L x W x H).

3.5 IPA LEVEL INDICATING PANEL

This panel consists of level indicators and high level alarm for 3 numbers of IPA storage tanks. The size of the control panel is 600 x 300 x 800mm (L x W x H).

4.0 BILL OF MATERIALS (BOM)

A. Supply Portion

Sl. No.	Description	Make	Unit	Qty
1	1100v grade XLPE insulated armoured copper cable of size - 12Pair X 1.0 Sq.mm	Polycab/LAPP /KEI/Orbit	Mtr	600
2	1100v grade XLPE insulated armoured copper cable of size - 12Pair X 1.5 Sq.mm	Polycab/LAPP /KEI/Orbit	Mtr	600
3	1100v grade XLPE insulated armoured copper cable of size 4core x 2.5 Sq.mm	Polycab/LAPP /KEI/Orbit	Mtr	1200
4	1100v grade XLPE insulated armoured copper cable of size 4core x 6.0 Sq.mm	Polycab/LAPP /KEI/Orbit	Mtr	200
5	Marshaling Panel Floor Standing Junction Box 800mm x 1800mm x 300mm	Standard	No's	1
6	Wall mount Junction Box 500 x 200 x 500mm	Standard	No's	1
7	Double compression cable glands of size-16, 20, 22, 24, 29 mm	Standard	No's	290
8	Cable shroud, support, cable lugs, ferrules	Standard	Lot	1

B. Service portion

Sl. No.	Description	Qty
1	Dismantling of existing panels	LS
2	Relocation and installation of panels to the new control room	LS

3	Installation junction box	LS
4	Laying and termination of cables from field to junction box	LS
5	Laying and termination of cables from junction box to panels	LS
6	Commissioning of the panel	LS

5.0 OTHER CONDITIONS

1. **Cable size and type:** The cable size and type should be suitable for the load and voltage rating of the control panel.
2. **Insulation and sheathing:** Cables should have proper insulation and sheathing to prevent electrical shock and damage from environmental factors.
3. **Laying conditions:**
 - Cables should be laid at a depth of at least 1.5 meters below ground level and should be protected from mechanical damage using masonry blocks.
 - Cable markers shall be provided over cable trenches for identification.
 - Hume pipes/concrete structure with slab over it shall be provided at road crossings.
4. **Segregation:** control cables, instrumentation cables and communication cables should be segregated from power cables to prevent electromagnetic interference.
5. **Earthing and bonding:** the control panel and cables should be properly earthed and bonded to prevent electrical shock. 2 Nos. of earthing strip of 25 mm x 3mm copper on each side of the panel shall be provided and earthing of switches with suitable copper wire/strip and connection to common earth bus.
6. **Fire resistance:** cables should be fire-resistant and confirm to IS 694:1990 or equivalent standards.
7. **Testing and certification:** The underground cabling should be tested and certified by a competent authority before commissioning.

6.0 GENERAL CONDITIONS

1. The vendor should be an ISO 9001:2015 certified firm and previous experience in similar works in VSSC or any Central government firms or reputed public sector firms.
2. **Party shall visit the site for work estimation before submitting the offer. Parties who had made site visit for assessment of work, alone will be considered for bid evaluation.**
3. **Delivery/ completion Schedule:**
 - ✓ **Submission of Design Documents:** Party shall submit Design Document after detailed engineering within 4 weeks from the receipt of Purchase Order. Design Documents shall include Panel GA drawing, SLD, Wiring Diagram, Cable Schedule, JB Schedule and

Instrumentation Index. Party shall submit as built diagram after completion of works.

- ✓ **Supply of items:** The items shall be supplied within 3 weeks from the approval of design documents by VSSC.
- ✓ **Installation and commissioning:** The party shall complete the installation and commissioning of the unit at our site, within 4 weeks from the date of intimation of site readiness by VSSC.
- ✓ **Warranty:** Party shall provide warranty for all the deliverables including the entire system commissioned for a period of 12 months from the date of successful erection and commissioning.

4. **Payment:** The vendor should submit a cost break up as per the format given in the price bid. Payment will be made pro-rata as indicated below based on the price break up.

On completion of supply of materials and acceptance by Department.	70%
On completion of installation and pre-commissioning checks.	20%
On completion of testing, evaluation and acceptance of the integrated system.	10% against production of performance BG

- 5. Since the requirement is for our time bound programme party shall offer realistic supply schedule and should stick to schedule strictly.
- 6. Party shall incorporate any minor modifications required at the time of erection without any additional cost.
- 7. Vendor has to consider all the materials/components required for realization of a fully functional system irrespective of their mention in the tender. Additional requirements, if any, to achieve a complete solution should be brought out specifically.

7.0 PRICE BID FORMAT

A. Supply Portion

Sl. No	Description	Unit	Qty	Unit cost	GST	Total cost
1	1100v grade XLPE insulated armoured copper cable of size -12Pair X 1.0 Sq.mm	Mtr	600			
2	1100v grade XLPE insulated armoured copper cable of size - 12Pair X 1.5 Sq.mm	Mtr	600			

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Sl. No	Description	Qty	GST	Total cost
1	Dismantling of existing panel	LS		
2	Relocation and installation of panels to the new control room	LS		
3	Installation junction box	LS		
4	Laying and termination of cables from field to junction box	LS		
5	Laying and termination of cables from junction box to panels	LS		
6	Commissioning of the panel	LS		