

## Annexure E4

Indent No. : C/6160/2009/3782T dated 06.08.09.  
Detailed Specifications ZTGT37092014:

Following are details of the area to be air-conditioned:

1. Size of the hall (length x width x height) = (20 mtr x 15.4 mtr x 5 mtr)
2. Relative Humidity = Less than 65 %
3. Required Temperature to be maintained = 21 degree to 25 degree centigrade.

### **Scheme**

Indoor units of Package units will be installed in the plant room.

The conditioned air will be thrown to the specified area by means of GSS ducting & then distributed through grilles. The return air will be taken back thru return directly from air-conditioned area to plant room.

The Air-cooled Condensing units of Package unit shall be placed at rooftop/outside of plant room, where free flow of air is available. The indoor unit (Main Package Unit) & outdoor units (Condensing Unit) shall be connected by means of hard copper refrigerant piping & electrical cabling.

| S.NO. | DESCRIPTION OF WORK                                                                                                                                                                                                                                                                                                                                                                                                                 | QTY | UNIT  |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------|
|       | <b>High Side work</b>                                                                                                                                                                                                                                                                                                                                                                                                               |     |       |
| 1     | Supply, Erection, Testing & Commissioning of Microprocessor controlled, Air Cooled Ductable split unit fitted with 02 Nos. of 5.5TR Scroll compressor complete with DX coil, filter and blower section with motor and drive, air cooled condenser, initial charge of gas and oil etc. including winter heating system. Acceptable Make: Voltas/Blue Star/Daikin/Carrier<br><b>Nominal Capacity : 11.0 TR (1working + 1 Standby)</b> | 2   | Nos   |
| S.NO. | DESCRIPTION OF WORK                                                                                                                                                                                                                                                                                                                                                                                                                 | QTY | UNIT  |
|       | <b>Low Side Work</b>                                                                                                                                                                                                                                                                                                                                                                                                                |     |       |
| 1     | Copper hard drawn refrigerant piping                                                                                                                                                                                                                                                                                                                                                                                                |     |       |
|       | 7/8 " dia                                                                                                                                                                                                                                                                                                                                                                                                                           | 32  | Rmt   |
|       | 5/8" dia                                                                                                                                                                                                                                                                                                                                                                                                                            | 32  | Rmt   |
| 2     | DUCTING<br>Supply installation of GSS ducting with necessary support hanger, nut bolts gaskets damper vanes canvass connection etc. as per the following gauge                                                                                                                                                                                                                                                                      |     |       |
|       | 24 Gauge                                                                                                                                                                                                                                                                                                                                                                                                                            | 125 | Sqmt  |
|       | 22 Gauge                                                                                                                                                                                                                                                                                                                                                                                                                            | 33  | Sqmt  |
| 3     | Supplying and fixing of acoustic lining 12 mm thick rigid bonded of 48 kg./cu mtr. fiber glass fixed on the inside of the duct covered with RP tissue paper and covered with 28 G thick perforated aluminium sheet including nut bolts, screws etc.                                                                                                                                                                                 | 14  | Sqmt  |
| 4     | Supplying and fixing of fibreglass wool 25mm thick. Cr-150 insulation of 24 kg/Cum covered with Aluminum foil on supply duct at tail end.                                                                                                                                                                                                                                                                                           | 140 | Sqmt  |
| 5     | Supply and installation of AL. powder coated individual grills/diffusers for supply & return air.                                                                                                                                                                                                                                                                                                                                   | 6   | Sq.mt |
| 6     | Supply and installation of MS Volume control/duct/coller/unit Damper.                                                                                                                                                                                                                                                                                                                                                               | 4   | Sq.mt |
| 7     | Supplying laying of PVC insulated PVC sheathed steel armoured 1.1 KV Grade LTMV Al. Conductor power inclusive of cable trays and end connection 4.0 C X 16 SQMM                                                                                                                                                                                                                                                                     | 30  | RMT   |

|    |                                                                                                                                                                                                               |    |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| 8  | Supplying installing testing and commissioning of control cable PVC insulated PVC sheathed steel armoured multicore copper conductor for outdoor unit and controlling of following size:<br>6 Core x 1.5 Sqmm | 30 | RMT |
| 9  | Providing and fixing 8 SWG dia G.I. Wire on surface or in recess for loop earthing as required                                                                                                                | 60 | RMT |
| 10 | Supply, installation of cable tray of slotted angle size 40mm X 40mm X14 G width upto 150 mm with necessary support.                                                                                          | 30 | Rmt |
| 11 | Design, fabrication, supply and installation of suitable Main panel for Package units with all metering and SFU in incoming and suitable MCB in outgoing.                                                     | 1  | No  |
| 12 | Fabrication and installation of MS Stand for condenser                                                                                                                                                        | 4  | No  |

## SPECIAL TERMS AND CONDITION

1. CONSTRUCTION OF AC PLANT ROOM ( 20 mtr x 15.4 mtr x 5 mtr ) , civil foundation for mounting package units and condenser units shall be done by BHEL.
2. To provide Power supply in the AC plant room,100A CFS UNIT along with earth strip shall be arranged by BHEL. Cable and terminals from this switch to control panel shall be arranged by the supplier.
- 3 Supplier shall submit detail lay out drawing for erection of equipment inside AC PLANT ROOM giving detail drawings of foundation of package unit, condenser unit, ,location of electrical control panel and Complete ducting lay out ,refrigerant piping route, power and control cable along with the offer.
4. In electrical panel contactors, relays, switch, push button, power and control fuse should be of L&T/SIMENS make only  
All indicating lamps shall have LED lamps only.  
All isolators shall be of MDS /L&T/ Havells make only.
- 5 All electrical motors, package units should be provided with double earthing using 8SWG wire
6. Fixing of supply grills, return air grills and fresh air grills is the responsibility of supplier, it include supply of wooden frames in the walls to enable installation of the grill.
7. If any quantity of items is required beyond the offered quantity then supplier should arrange themselves at their cost. Incase the quantity of items required less than the offered quantity then payment shall be made as per actual use.
8. Five sets of operational manual along with trouble shooting instruction ,power and electrical control schemes ,refrigeration circuit shall be submitted by supplier prior to commissioning. The control wiring scheme shall be properly numbered for proper identification for ease in fault tracing.

## Annexure E5

Indent No. : C/6160/2009/3783T dated 06.08.09  
Detailed Specifications ZTGT37093010:

Following are details of the area to be air-conditioned:

1. Size of the hall (length x width x height) = (24 mtr x 23 mtr x 7.5 mtr)
2. Relative Humidity = less than 65 %
3. Required Temperature to be maintained = 21 degree to 25 degree centigrade.

### **Scheme**

Indoor units of Package units will be installed in the plant room.

The conditioned air will be thrown to the specified area by means of GSS ducting & then distributed through grilles. The return air will be taken back thru return directly from air-conditioned area to plant room.

The Air-cooled Condensing units of Package unit shall be placed at rooftop/outside of plant room, where free flow of air is available. The indoor unit (Main Package Unit) & outdoor units (Condensing Unit) shall be connected by means of hard copper refrigerant piping & electrical cabling.

| S.NO. | DESCRIPTION OF WORK                                                                                                                                                                                                                                                                                                                                                                                                                  | QTY | UNIT  |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------|
|       | <b>High Side work</b>                                                                                                                                                                                                                                                                                                                                                                                                                |     |       |
| 1     | Supply, Erection, Testing & Commissioning of Microprocessor controlled, Air Cooled Ductable split unit fitted with 02 Nos. of 5.5TR Scroll compressor complete with DX coil, filter and blower section with motor and drive, air cooled condenser, initial charge of gas and oil etc. including winter heating system . Acceptable Make: Voltas/Blue Star/Daikin/Carrier<br><b>Nominal Capacity : 11.0 TR (1working + 1 Standby)</b> | 3   | Nos   |
| S.NO. | DESCRIPTION OF WORK                                                                                                                                                                                                                                                                                                                                                                                                                  | QTY | UNIT  |
|       | <b>Low Side Work</b>                                                                                                                                                                                                                                                                                                                                                                                                                 |     |       |
| 1     | Copper hard drawn refrigerant piping                                                                                                                                                                                                                                                                                                                                                                                                 |     |       |
|       | 7/8 " dia                                                                                                                                                                                                                                                                                                                                                                                                                            | 48  | Rmt   |
|       | 5/8" dia                                                                                                                                                                                                                                                                                                                                                                                                                             | 48  | Rmt   |
| 2     | DUCTING<br>Supply installation of GSS ducting with necessary support hanger, nut bolts gaskets damper vanes canvass connection etc. as per the following gauge                                                                                                                                                                                                                                                                       |     |       |
|       | 24 Gauge                                                                                                                                                                                                                                                                                                                                                                                                                             | 175 | Sqmt  |
|       | 22 Gauge                                                                                                                                                                                                                                                                                                                                                                                                                             | 50  | Sqmt  |
| 3     | Supplying and fixing of acoustic lining 12 mm thick rigid bonded of 48 kg./cu mtr. fiber glass fixed on the inside of the duct covered with RP tissue paper and covered with 28 G thick perforated aluminium sheet including nut bolts, screws etc.                                                                                                                                                                                  | 20  | Sqmt  |
| 4     | Supplying and fixing of fibreglass wool 25mm thick. Cr-150 insulation of 24 kg/Cum covered with Aluminum foil on supply duct at tail end.                                                                                                                                                                                                                                                                                            | 205 | Sqmt  |
| 5     | Supply and installation of AL. powder coated individual grills/diffusers for supply & return air.                                                                                                                                                                                                                                                                                                                                    | 9   | Sq.mt |
| 6     | Supply and installation of MS Volume control/duct/coller/unit Damper.                                                                                                                                                                                                                                                                                                                                                                | 5   | Sq.mt |
| 7     | Supplying laying of PVC insulated PVC sheathed steel armoured 1.1 KV Grade LTMV Al. Conductor power inclusive of cable trays and end connection 4.0 C X 16 SQMM                                                                                                                                                                                                                                                                      | 45  | RMT   |

|    |                                                                                                                                                                                                               |    |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| 8  | Supplying installing testing and commissioning of control cable PVC insulated PVC sheathed steel armoured multicore copper conductor for outdoor unit and controlling of following size:<br>6 Core x 1.5 Sqmm | 45 | RMT |
| 9  | Providing and fixing 8 SWG dia G.I. Wire on surface or in recess for loop earthing as required                                                                                                                | 90 | RMT |
| 10 | Supply, installation of cable tray of slotted angle size 40mm X 40mm X14 G width upto 150 mm with necessary support.                                                                                          | 40 | Rmt |
| 11 | Design, fabrication, supply and installation of suitable Main panel for Package units with all metering and SFU in incoming and suitable MCB in outgoing.                                                     | 1  | No  |
| 12 | Fabrication and installation of MS Stand for condenser                                                                                                                                                        | 6  | No  |

## SPECIAL TERMS AND CONDITION

1. CONSTRUCTION OF AC PLANT ROOM 24 MTR (L) X 23 MTR (W) X 7.5 MTR (H), civil foundation for mounting package units and condenser units shall be done by BHEL.
2. To provide Power supply in the AC plant room, 100A CFS UNIT along with earth strip shall be arranged by BHEL. Cable and terminals from this switch to control panel shall be arranged by the supplier.
- 3 Supplier shall submit detail lay out drawing for erection of equipment inside AC PLANT ROOM giving detail drawings of foundation of package unit, condenser unit, location of electrical control panel and Complete ducting lay out, refrigerant piping route, power and control cable along with the offer.
4. In electrical panel contactors, relays, switch, push button, power and control fuse should be of L&T/SIMENS make only  
All indicating lamps shall have LED lamps only.  
All isolators shall be of MDS /L&T/ Havells make only.
- 5 All electrical motors, package units should be provided with double earthing using 8 SWG wire
6. Fixing of supply grills, return air grills and fresh air grills is the responsibility of supplier, it includes supply of wooden frames in the walls to enable installation of the grill.
7. If any quantity of items is required beyond the offered quantity then supplier should arrange themselves at their cost. In case the quantity of items required is less than the offered quantity then payment shall be made as per actual use.
8. Five sets of operational manual along with trouble shooting instruction, power and electrical control schemes, refrigeration circuit shall be submitted by supplier prior to commissioning. The control wiring scheme shall be properly numbered for proper identification for ease in fault tracing.