



**STATE BANK OF PAKISTAN
SBP BANKING SERVICES CORPORATION (BANK)**

TENDER DOCUMENTS

SECTION-V

VOLUME – II (C)

**OPERATION AND MAINTENANCE SERVICES
OF
ELECTRICAL, MECHANICAL & HVAC WORKS
FOR
CONSTRUCTION OF SBP NEW OFFICE BUILDING
AT
GUJRANWALA**

STATE BANK OF PAKISTAN, SBP BSC (BANK)
CONSTRUCTION OF SBP NEW OFFICE BUILDING AT GUJRANWALA
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PART A

OPERATION & MAINTENANCE SERVICES FOR ELECTRICAL & MECHANICAL WORKS



SCOPE OF SERVICES

Section-I: Diesel Generators and General Electrical Maintenance

1. Location of Premises and Equipment:

<u>Location</u>	<u>Equipment</u>
Construction of SBP New Office Building at Gujranwala	Operation and maintenance of following items: (a) 04 Nos. Emergency Diesel Generators (02 Nos. 500KVA, 01 No. 110KVA & 01 No. 33KVA) as quoted including General Electrical Maintenance of all Buildings covered under this Contract (b) Allied Electrical Equipment ATS Panels (c) Fuel storage tanks (d) Batteries (e) Change overs (f) Distribution Boards (g) Electric Panels (h) Sub Main Panels (i) Transformers (j) Circuit Breakers (k) Control Panels (l) Power and control wiring (m) Any other device or component operating in conjunction with above listed equipment. Complete in all respect as directed by Engineer

2. Operation & Maintenance Contract for Electrical Equipment:

The Contractor shall be responsible for operation & maintenance of 02 Nos. 500KVA, 01 No. 110KVA & 01 No. 33KVA DG sets for a period of 546 days after issuance of Taking-Over Certificate. Cost of fuel, lubricants and spares such as filters, belts etc. required for scheduled maintenance shall be borne by the Employer and the parts (under warranty) required for unscheduled maintenance or breakdowns will be provided by the Contractor. Further, Consumable materials like kerosene oil, grease, cotton, duster, cleaning brush, vacuum cleaner tools etc. will be arranged by the Contractor from its own sources for which no extra payment will be made by the Employer.

Scope of Services under this Contract are as follows:

Operation, Maintenance, Services and general upkeep of the following equipment:

- a) Diesel generators of 02 Nos. 500KVA, 01 No. 110KVA & 01 No. 33KVA capacities respectively.
- b) Allied equipment for above DG Sets including fuel tank(s) and respective pumps, control panel(s), change over, batteries, ATS system, distribution boards, PFI Plants, electric panels, sub panels, Transformer DBs, Circuit breakers, apparatus control panel, power and control wiring, switch gears.

- c) Complete Electrical System installed in all Buildings covered under this Contract.
 - i. Immediate removal and appropriate disposal of waste, such as used oil and filters, defective lights, and other such items according to municipal codes and environmental standards.
 - ii. Cleaning of generator rooms/sheds and surrounding areas.
 - iii. Any other work assigned by the Employer.

3. Qualification, Training and Experience

- a) Resources deployed at site must be qualified, trained and experienced in their respective areas and able to perform services as mentioned below to the entire satisfaction of the Employer.
- b) Bio data and police verification of each personnel must be submitted to the Employer prior to deployment.
- c) Minimum Qualification should be as under;

S#	Description	Quantity	Minimum Qualification
1	Site In-Charge/ Engineer	01	Bachelors in Electrical Engineering/ B. Tech with minimum 10 years relevant experience
2	Supervisor	01	DAE (Electrical) with minimum 08 years relevant experience
3	Electrician (per shift 2 Electricians, total 3 shifts per day)	04	Matriculation with minimum 03 years relevant experience
4	Electrical Helper	03	Minimum 03 years relevant experience

4. Description of Services for Diesel Generators

- a) Contractor shall provide adequately trained and qualified technical services for operation, maintenance and servicing of all Diesel Generators and their allied equipment including change over, fuel storage tanks, pump, ATS and other associated electrical installations.
- b) Continuous and uninterrupted presence (as mentioned in duty hours and schedule below) is required near the generators, 24 hours per day, 7 days per week, for works pertaining to the generators and associated systems as listed, but not limited to, the following:
 - i. Monitoring incoming electrical supply and making sure the generators start immediately after disruption of electrical supply.
 - ii. Monitoring generators for abnormal noise, vibration or any other condition.
 - iii. Carrying out routine maintenance for generators and associated equipment and systems.
 - iv. Calling for external help in situations and whenever necessary.
 - v. Maintaining a log of attendances and Standard Operating Procedures (SOPs)

as required by the Employer.

- vi. Supervision of all electrical system activities and liaison with the Employer's staff in situations.
 - vii. Maintenance activities necessary to maintain/ repair all contractually covered equipment in trouble-free and smooth operating condition.
 - viii. Removal and disposal of waste.
 - ix. Smooth operation of Services.
 - x. Ensuring that the Contractor's Personnel attend to any instruction/ call from the Employer immediately on such communication, and in any event, not later than thirty (30) minutes. The Contractor's Personnel shall obtain confirmation/ approval from the Employer's authorized representative before execution of Services.
 - xi. A complete daily general checking of the entire installation shall be carried out by the Contractor's Personnel and they will immediately convey any abnormality in electrical/ electronic/ mechanical, as well as, making immediate arrangement to set right such abnormality.
 - xii. Submit the report for any modification to improve the performance of system for smooth operation.
- c) The routine maintenance will not be limited to the working schedule, the Contractor has to carry out other repair / maintenance, operation & services upkeep as and when required.
 - d) The Contractors' supervisor at site shall inform the Employer about requirement for diesel fuel (backup for 15 days) or engine oil well in advance so that same could be arranged in time by the Employer.
 - e) Contractor's Personnel will not be allowed to leave their duty without permission of the Employer.
 - f) A fitness certificate regarding performance and excellent condition of DG sets and allied equipment will be submitted by the Contractor along with their bill.
 - g) The Contractor's Personnel shall immediately report to the Contractor and the Employer, if the fault is beyond their capability.
 - h) Contractor must have sufficient stock of spare parts for immediate replacement of defective part(s) with new one to avoid interruption in DG sets operation.
 - i) The Contractor shall carry out the Services in accordance with international codes for operation & maintenance of Diesel Generating sets, their allied equipment/ machinery and electrical substation & its allied equipment and IEC standards and instructions and with the required skilled labour under the direction of the experienced engineer-in-charge of the Contractor and in line with the service manual of the supplier/ manufacturer. The Contractor's personnel shall provide servicing for the DG sets. Contractor will not make any alteration/ modification etc. in existing DG sets without prior written approval of the Employer.
 - j) Contractor's employees shall remain in identifiable uniform throughout their duty hours, failing which the Employer will impose a penalty of Rs 500/- (Rupees five

hundred only) per day per person.

- k) Contractor will fill all relevant equipment preventive maintenance checklists as per Electrical Handbook on daily/ weekly/ monthly/ semi-annually/ annually and maintain all records of all checklists.
- l) Penalty will be imposed at the rate of Rs. 1,000/- (Rupees One Thousand only) per occurrence per day for non-operation of any Generator due to any reason. The penalty may be deducted from the Contractor's bill and may be waived on the sole discretion of the Employer.

5. General Electrical Maintenance Services

- a) Contractor will provide the general electrical services to maintain complete electrical system i.e. distribution panel system including Diesel Generators, Distribution Boards, Electric Panels, Sub Panel, Transformers DBs, light fixtures, Circuit Breakers etc. installed in all Buildings covered under this Contract.
- b) In case of an emergency or fault in the system, the Contractor shall provide the necessary support and services to rectify the issue immediately within 30 minutes.
- c) The contractor shall be obliged to conduct monthly survey and checkup of all installed electrical system (including telecom and audio system) to ensure proper functioning and operation. In this regard, Contractor will fill all relevant equipment preventive maintenance checklists as per Electrical Handbook on daily/ weekly/ monthly/ semi-annually/ annually and maintain all records of all checklists.
- d) The Contractor shall be obliged to arrange qualified engineering services for monthly inspection or as and when required by the Employer or in any emergency like situation for the generators and allied electrical and mechanical systems. The Contractor will afterwards submit a detailed report entailing the findings and/ or remedial measures of the qualified engineering services.
- e) The Contractor shall provide services for smooth and uninterrupted operation as well as maintenance, services and general upkeep for the above listed equipment.
- f) Contractor shall refer to Operation and Maintenance (O&M) manuals of above equipment for performing maintenance and upkeep work and follow instructions therein.
- g) The Contractor shall ensure that the Contractor's employee(s) attend to any instruction/ call from the Employer immediately upon such communication. The Contractor's employee(s) shall obtain confirmation/ approval from the Employer's authorized representative before execution of services.
- h) A complete daily general checking of the entire installation shall be carried out by the Contractor's employee(s) and they will immediately convey any abnormality in the equipment and allied systems listed above, as well as make immediate arrangements to set right such abnormalities. Moreover, Contractor shall maintain related records and produce such records on demand by the Employer.
- i) The Contractor shall attend to the maintenance or repair work on priority basis after office hours or on the holiday(s)/ Sunday(s) if so warranted or at any time due to exigencies/ emergencies and will provide services for smooth operation in the minimum possible time. The Contractor's site engineer/ supervisor shall inform the

Employer's representative well in advance about any maintenance/ repair/ service work scheduled to be done by the Contractor after office hours or on Sunday(s)/ Holiday(s) so that necessary security arrangement and access for the Contractor's staff be made by the Employer.

- j) Routine maintenance will not be limited to the working schedule. The Contractor must carry out other repair/ maintenance, operation & services upkeep as and when required so as to keep the equipment in top running condition.
- k) Contractor will be responsible to make good all the damages to all appliances due to abnormal generator's supply. They may advise the Employer about all protective devices that may be installed in generator to avoid damages/ loss of connected load / circuits/ apparatus with generator supply.
- l) The Contractor's employee(s) at site shall immediately report to the Contractor and the Employer if the fault is beyond their capability, and the Contractor shall depute its team immediately to resolve the issue.
- m) The Contractor shall carry out the Services in accordance with professional codes and instructions and with the required skilled labor under the direction of the experienced engineer-in-charge of the Contractor and in line with the service manual of the supplier/ manufacturer/ Electrical Handbooks.
- n) Electrical Rooms/ Substation Room/ Generator room and its vicinity/ area pertain to Generators/ Transformers and allied equipment will be kept clean and tidy and light/ fan etc repairing shall be performed by the Contractor's staff.
- o) Contractor's employee(s) shall not leave the site without handing over the charge to next shift.
- p) Contractor's employee(s) will not be allowed to leave their duty without prior information to Employer.
- q) Contractor's employee(s) shall remain in identifiable, neat and clean uniform while on duty. Failing which a penalty of Rs. 500/- (Rupees five hundred only) per day per person will be imposed by the Employer.
- r) All routine maintenance and normal repairs will be done by the Contractor at his own cost and the total bid will be inclusive of all such repairs.
- s) The Contractor shall submit reports for modification in equipment or processes to improve the performance of system for smooth operation.
- t) Contractor must keep sufficient stock of running spare parts for immediate replacement to avoid interruption in smooth operation.
- u) The Contractor shall provide round the clock 24/7 on call support and shall be obliged to dispatch the services outside normal office hours within the hour as and when required by the Employer.

6. List of Minimum Equipment

Sr. No.	Equipment Description	Qty
1.	Plier Set	2 Nos.

Sr. No.	Equipment Description	Qty
2.	Cutter Plier Set	2 Nos.
3.	Screw Driver Star Set	1 No.
4.	Ring Spanner Set	1 No.
5.	Star L-Key Set	1 No.
6.	L. Key Set	1 No.
7.	Box Spanner set	1 No.
8.	Screw Drivers Set (DG Sets)	2 Nos.
9.	Hammer Cross Peen 1Kg	2 Nos.
10.	Drill Machine	3 Nos.
11.	Hydrometer	3 Nos.
12.	Battery Boost Charger External	2 Nos.
13.	Battery Load Tester	2 Nos.
14.	Digital Multimeter	1 Nos.
15.	Digital Tongue Tester(Clamp meter) 1000A	1 No.
16.	Air Blower	1 No.
17.	Vacuum Cleaner	1 No.
18.	Screw wrench	1 No.
19.	Screw Driver Set	1 No.
20.	Hammer Ball Peen 1Kg	1 No.
21.	Tool Box/Bag	1 No.
22.	Filter Opener(Oil /Fuel)	1 No.
23.	D-Spanner Set	1 No.
24.	Torch	1 No.

7. Duty Hours and Schedule

a) The following timings shall be followed:

Sr. No.	Description of Worker	Proposed Number of Workers	Timings
1.	Operation and Maintenance of 04 Nos. DG sets and General Electrical Maintenance of all Buildings covered under this Contract, complete in all respect as directed by the Engineer.	Total: 11 Persons	3 shifts, 24 hours per day, 7 days per week

b) The above mentioned timings may be changed as per Employer's instructions. The Contractor shall follow the same pattern during the month of Ramadan or as may be

directed by the Employer.

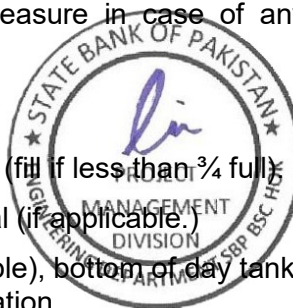
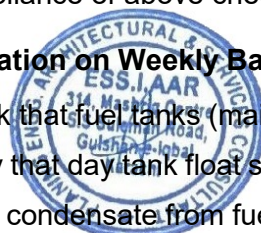
- c) The Contractor shall follow the general schedule given above for performing Services. However, the schedule shall not limit the Services performed by the Contractor, and the Contractor shall carry out such Services, as and when required immediately to keep the equipment covered under this contract in good running condition. The Contractor's employee(s) shall also follow the instructions of Employer's representative and carry out all repairing/ maintenance work as and when required/ pointed out by the Employer's representative.
- d) Contractor's staff shall mark attendance and Contractor shall provide stationeries, log book, log sheets etc and attendance register with proper binding for maintaining record and it shall be maintained properly.
- e) Shifts shall be evenly rotated and Contractor shall prevent any irregularity.
- f) Daily and periodic maintenance/ checking for DG sets shall be carried out as per manufacturer's instructions and shall also include (but not limited to) following service. Checklists and reports for the following work must be submitted to the Employer with their invoices.

(A) Operations on Daily Basis

- a) Clean the generator set, control panel and generator room.
- b) Check for fluid leakage and leaks in the exhaust system.
- c) Check the fuel tank level, fill as necessary.
- d) Check the engine oil and coolant levels (solution of Ethylene Glycol or Propylene Glycol with water 50/50, or consult manufacturer's instructions for particular generator), replenish as necessary.
- e) Check the battery electrolyte fill with distilled water as necessary.
- f) Check the battery connection and terminals make it clean and tight if necessary.
- g) Observe the functioning of battery charger.
- h) Check for any abnormal noise and vibration after start of engine.
- i) Check the control panels (power wizard) for indication of operation,
- j) particularly abnormal temperature (beyond 95 °C on load, consult manufacturer manual for particular engine) and oil pressure (30 – 60 psi, consult manufacturer manual for particular engine).
- k) Check the control panel for correct voltage and frequency.
- l) Checking of generator on no load for 5 minutes and observe for any abnormality.
- m) Immediately report and take corrective measure in case of any abnormality/non-compliance of above check list.

(B) Operation on Weekly Basis

- a) Check that fuel tanks (main and day) are full (fill if less than $\frac{3}{4}$ full)
- b) Verify that day tank float switch is operational (if applicable.)
- c) Drain condensate from fuel filters (if applicable), bottom of day tank, bottom of main fuel tank, and check fuel for water contamination.



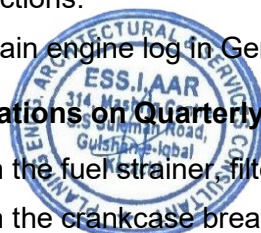
- d) Verify that supply or transfer fuel pump is operational.
- e) Check fuel line flexible and rubber hoses & connectors for damage or leaks.
- f) Check engine oil level and appearance (add as required).
- g) Verify that lube oil heater is operational (if applicable).
- h) Check coolant level and squeeze hoses and inspect hoses and connections for leaks.
- i) Check engine water pump(s) for leaks and noise.
- j) Verify that radiator has adequate fresh air.
- k) Verify that voltage and charging current readings are normal, pilot lights are on or battery failure, electrolyte level is normal, battery terminals are dry and terminals are clean, tight, and free from corrosion.
- l) Inspect electrical system, engine, and generator.
- m) Verify that system is set for automatic start and transfer and proper working of ATS (Automatic Transfer Switch).

(C) Operation on Monthly Basis

- a) Check and record battery system specific gravity and voltage of the pilot cell of each battery. Equalize charge, if required.
- b) Check level of electrolyte. Refill to proper level. Abnormal use of water indicates overcharging.
- c) Record engine running time meter reading at start and end of test.
- d) Simulate normal power failure from a "cold start" by use of the test switch in the automatic transfer switch or by opening normal power supply to the power supply system (EPSS). Observe and record time delay on start and operate the unit under full load (if applicable) for few minutes. Record time on re-transfer.
- e) Record cranking time (terminates when engine starts.)
- f) Record AC voltage, frequency, and amperage.
- g) Record oil pressure, water, oil and air temperature after 15 minutes running time.
- h) While unit is operating, thoroughly observe operation for any indication of defects or possible malfunctions.
- i) Check exhaust system and muffler for leaks.
- j) Verify that transfer switch normal position pilot light is illuminated and isolating switch is closed – standby () and system is set for automatic start and transfer.
- k) Verify that all alarm pilot lights off.
- l) After unit has been operated, check lubricant and coolant according to manufacturer's instructions.
- m) Maintain engine log in Generator Room.

(D) Operations on Quarterly Basis

- a) Clean the fuel strainer, filter, and dirt leg.
- b) Clean the crankcase breather, replace in accordance with manufacturer's instructions.
- c) Check the exhaust system for proper clearance and that insulation is complete.



- d) Check that where wires are subject to movement that chafing has not occurred.
- e) Verify that all engine-operating alarms and safety shutdown devices (coolant temperature, oil pressure, over speed etc. consult manufacturer's recommendation for particular generator) function properly.

(E) Operation on Semi-Annual Basis

- a) Check that electrical boxes, panels, and cabinets are properly enclosed and not damaged.
- b) Service the air cleaner. Replace as required.
- c) Check the control panels (power wizard) for indication of operation, particularly abnormal temperature and oil pressure.
- d) Checking of flexible and rubber hoses/pipes.
- e) Change fuel and oil filters.

(F) Operation on Annual Basis

- a) Inspect and adjust rack on unit injector or fuel distributor pump according to manufacturer's instructions. Check injector pump and injectors.
- b) Flush cooling system and check hoses.
- c) Check the calibration of voltage-sensing relays/devices.
- d) Change governor oil (if applicable).
- e) Inspect and clean generator rotor, stator, and exciter.
- f) Clean commutator and collector rings. Check brush wear and tension in accordance with manufacturer's instructions.
- g) Measure and record resistance reading of generator windings. Note: First separate brushes from commutator to avoid damage to control circuits.
- h) Check generator bearings and bearing grease. Lubricate in accordance with manufacturer's instructions.
- i) Visually check bus bars, bracing, and feeder connections for cleanliness and signs of overheating.
- j) Perform other work prescribed by the manufacturer.
- k) Cleaning of bulk storage tank.
- l) Every 3 years or 500 operating hours or as prescribed by the manufacturer:
- m) Check and adjust valve clearance.
- n) Torque bolts.



Section-II: Description of Services for Operation & Maintenance of Lifts

1. Location of Premises and Equipment:

<u>Location</u>	<u>Equipment</u>
Construction of SBP New Office Building at Gujranwala	Operation and maintenance of 06 Lifts i.e. 02 No. Passenger Lift of 1000 kg capacity & 04 Nos. Passenger cum Cargo Lifts of 1250 kg capacity. Complete Allied equipment of all lifts in machine room such as electrical and control cabinets, batteries, motors, ropes, relays and switches and any other device or component operating in conjunction with above listed equipment. Complete in all respect as directed by engineer in-charge.

2. Operation & Maintenance Contract for Electrical Equipment:

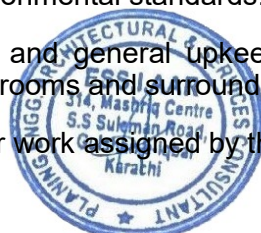
The Contractor shall be responsible for operation & maintenance of 06 Lifts i.e. 02 No. Passenger Lift of 1000 kg capacity & 04 Nos. Passenger cum Cargo Lifts of 1250 kg capacity for a period of 546 days starting from the date it has been handed over to the Employer. Cost of spares/ lubricants required for scheduled maintenance shall be borne by the Employer and the parts (under warranty) required for unscheduled maintenance or breakdowns will be provided by the Contractor. Further, Consumable materials like kerosene oil, grease, cotton, duster, cleaning brush, vacuum cleaner tools etc. will be arranged by the Contractor from its own sources for which no extra payment will be made by the Employer.

Scope of Services under this Contract are as follows:

The major items of Services under this Contract are as follows:

Operation, Maintenance, Services and general upkeep of the following equipment:

- 01 No. Passenger Lift of 800 kg capacity, 02 Nos. Passenger cum Cargo Lifts of 1600 kg capacity and 02 Nos. Passenger lift of 1000 kg capacity .
- Allied equipment in machine room such as electrical and control cabinets, batteries, motors, ropes, relays and switches and any other device or component operating in conjunction with above listed equipment.
- Immediate removal and appropriate disposal of waste, such as used oil and filters, defective lights, and of other such items according to municipal codes and environmental standards.
- Cleaning and general upkeep of lift cars interior and exterior, shaft wells, Machine rooms and surrounding areas.
- Any other work assigned by the Employer.



3. Qualification, Training and Experience

- (a) Resources deployed at site must be qualified, trained and experienced in their respective areas and able to perform services as mentioned below to the entire satisfaction of the Employer.
- (b) Bio data and police verification of each personnel must be submitted to the Employer prior to deployment.
- (c) Minimum Qualification should be as under;

S#	Description	Quantity	Minimum Qualification
1	Supervisor	01	DAE in relevant field with minimum 08 years relevant experience
2	Lift Operators	03	Matriculation with minimum 03 years relevant experience

4. Description of Services

(A) Services for Passenger cum Cargo Lifts and Machine Room:

Continuous and uninterrupted presence is required in the machine rooms for the following services:

- a) Attending to phone calls and responding as necessary.
- b) Communicating with trapped persons inside lift and issuing instructions as necessary.
- c) Monitoring lift machinery for abnormal noise, vibration or any other condition.
- d) Calling for external help in emergency situations and whenever necessary.
- e) Supervision of activities and liaison with the Employer's staff in emergency situations.
- f) Maintaining a log of attendances and Standard Operating Procedures (SOPs) as required by the Employer.
- g) Supervision of inspection and maintenance activities as per manufacturer recommendations or Electrical handbook necessary to maintain the lift in trouble-free and smooth operating condition.
- h) Supervision of Contractor's staff at the Employer's premises.
- i) Troubleshooting in case of defects, abnormal operation and complaints. Calling for backup support if necessary to further troubleshoot and rectify the malfunction.
- j) Removal and disposal of waste.
- k) Continuous and uninterrupted presence is required for passenger cum cargo lift.
- l) Checking the car for proper operation of safety and communication devices, lighting and ventilation.
- m) Immediate evacuation of trapped persons in case of emergency.
- n) Reporting to Contractor's supervisor or calling for external help in emergency situations and to report missing parts or abnormal running condition.

- o) Cleaning the car complete in all respect.
- p) Immediately attending to the lift(s) in case of emergency.
- q) Immediately attending to faults and defects in components or operation, and rectifying the same to facilitate smooth and uninterrupted operation.
- r) Contractor will fill all relevant equipment preventive maintenance checklists as per Electrical Handbook on daily/ weekly/ monthly/ semi-annually/ annually and maintain all records of all checklists.

(B) Services for Passenger Lift:

In addition to and concurrent with, a), above, continuous and uninterrupted presence is required for the following services:

- a) Attending to phone calls and responding as necessary.
- b) Communicating with trapped persons inside lift(s) and issuing instructions as necessary.
- c) Monitoring lift machinery for abnormal noise, vibration or any other condition.
- d) Calling for external help in emergency situations and whenever necessary.
- e) Supervision of activities and liaison with the Employer's staff in emergency situations.
- f) Maintaining a log of attendances and SOP's as required by the Employer.
- g) Supervision of inspection and maintenance activities as per manufacturer recommendations or Electrical handbook necessary to maintain the lift in trouble-free and smooth operating condition.
- h) Supervision of Contractor's staff at the Employer's premises.
- i) Troubleshooting in case of defects, abnormal operation and complaints. Calling for backup support if necessary to further troubleshoot and rectify the malfunction.
- j) Removal and disposal of waste.
- k) Continuous and uninterrupted presence is required for passenger lift.
- l) Checking the car for proper operation of safety and communication devices, lighting and ventilation.
- m) Immediate evacuation of trapped persons in case of emergency.
- n) Reporting to Contractor's supervisor or calling for external help in emergency situations and to report missing parts or abnormal running condition.
- o) Cleaning the car complete in all respect.
- p) Immediately attending to the lift(s) in case of emergency.
- q) Immediately attending to faults and defects in components or operation, and rectifying the same to facilitate smooth and uninterrupted operation.
- r) Contractor will fill all relevant equipment preventive maintenance checklists as per Electrical Handbook on daily/ weekly/ monthly/ semi-annually/ annually and maintain all records of all checklists.

(C) Support Services

In addition to, and concurrent with, a), b) above, continuous and uninterrupted presence is required for the following support services:

- a) Provide assistance in emergency situations and evacuations.
- b) Provide assistance in troubleshooting or repair and rectification work.
- c) Provide technical services for inspection of passenger and bullion lifts on a regular basis and rectify any issues and faults encountered thereof.
- d) Carry spare parts, tools or documentation between work sites.
- e) Going off-site to bring in parts, material, documents or consumables as instructed by Contractor's supervisory staff.
- f) Any other work assigned by the Contractor's supervisory staff

(D) General Services

- a) The Contractor shall provide services for smooth and uninterrupted operation as well as maintenance services for general upkeep of the above listed equipment.
- b) Contractor shall refer to Operation and Maintenance (O&M) manuals of equipment for performing maintenance and upkeep work and follow instructions therein.
- c) The Contractor shall ensure that the Contractor's employee(s) attend to any instruction/ call from the Employer immediately upon such communication. The Contractor's employee(s) shall obtain confirmation/ approval from the Employer's authorized representative before execution of services.
- d) A complete daily general checking of the entire installation shall be carried out by the Contractor's employee(s) and they will immediately convey any abnormality in the equipment and allied systems listed above, as well as make immediate arrangements to set right such abnormalities. Moreover, Contractor shall maintain checklists records as per electrical handbook and produce such records on demand by the Employer.
- e) The Contractor shall attend to the maintenance or repair work on priority basis after office hours or on holiday(s) if so warranted, or at any time due to exigencies/ emergencies and will provide services for smooth operation in the minimum possible time. The Contractor's site engineer/supervisor shall inform the Employer's representative well in advance about any maintenance/ repair/ service work scheduled to be done by the Contractor after office hours or on holiday(s) so that necessary security arrangement and access for the Contractor's staff be made by the Employer.
- f) A complete general checking of the entire lift and its allied equipment/ accessories shall be carried out by the Contractor at least once a month during which the defective part(s) shall be replaced by new one(s), if required.
- g) Routine maintenance will not be limited to the working schedule. The Contractor must carry out other repair/ maintenance, operation & services upkeep as and when required so as to keep the equipment in top running condition.

- h) Penalty will be imposed at the rate of Rs. 1,000/- (Rupees One Thousand only) per lift per day for non-operation of lift due to any reason. The penalty may be deducted from the Contractor's bill and may be waived on the sole discretion of the Employer.
- i) A fitness certificate regarding performance and excellent condition of lift(s), countersigned by the Employer's representative, will be submitted by the Contractor along with their each monthly bill.
- j) The Contractor's employee(s) at site shall immediately report to the Contractor and the Employer if the fault is beyond their capability, and the Contractor shall depute its team immediately to resolve the issue.
- k) The Contractor shall carry out the Services in accordance with professional codes and instructions and with the required skilled labor under the direction of the experienced engineer-in-charge of the Contractor and in line with the service manual of the supplier/ manufacturer. The Contractor's Personnel shall provide servicing for all parts of lift(s). Contractor will not make any alteration/ modification etc. in existing lift machinery without prior written approval of the Employer.
- l) The Contractor shall be responsible for operation and maintenance of control and electric panels installed for the lift(s), and fitness certificate shall be provided monthly.
- m) Machine room and its vicinity pertaining to lifts and allied equipment will be kept clean and tidy and light/ fan etc. repair shall be performed by the Contractor's staff.
- n) Contractor's employee(s) will not be allowed to leave their duty without prior information to Employer.
- o) Contractor's employee(s) shall remain in identifiable, neat and clean uniform while on duty. Failing which a penalty of Rs 500/- (Rupees five hundred only) per day per person will be imposed by the Employer.
- p) All routine maintenance and normal repairs will be done by the Contractor at his own cost and the total bid will be inclusive of all such repairs.
- q) The Contractor shall submit reports for modification in equipment or processes to improve the performance of system for smooth operation.
- r) Contractor must keep sufficient stock of running spare parts for immediate replacement to avoid interruption in smooth operation.

5. List of minimum equipment is given below:

S. No.	Equipment Description	Qty
1.	Plier Set	2 Nos.
2.	Cutter Plier Set	2 Nos.
3.	Screw Driver Star Set	1 No.
4.	Ring Spanner Set	1 No.
5.	Star L-Key Set	1 No.
6.	L. Key Set	1 No.

S. No.	Equipment Description	Qty
7.	Box Spanner set	1 No.
8.	Screw Drivers Set (DG Sets)	2 Nos.
9.	Hammer Cross Peen 1Kg	2 Nos.
10.	Drill Machine	3 Nos.
11.	Hydrometer	3 Nos.
12.	Battery Boost Charger External	2 Nos.
13.	Battery Load Tester	2 Nos.
14.	Digital Multimeter	1 Nos.
15.	Digital Tongue Tester(Clamp meter) 1000A	1 No.
16.	Air Blower	1 No.
17.	Vacuum Cleaner	1 No.
18.	Screw wrench	1 No.
19.	Screw Driver Set	1 No.
20.	Hammer Ball Peen 1Kg	1 No.
21.	Tool Box/Bag	1 No.
22.	Filter Opener(Oil /Fuel)	1 No.
23.	D-Spanner Set	1 No.
24.	Torch	1 No.

6. Duty Hours and Schedule

(a) The following timings shall be followed:

Sr. No.	Service	Time	Days
1	Services for Passenger Lift and Machine Room	10 hours per day 08:00 AM to 06:00 PM	Monday-Friday 5 days every week
2	Services for Passenger cum Cargo Lift and Machine Room	10 hours per day 08:00 AM to 06:00 PM	Monday-Friday 5 days every week
3.	Maintenance and Repair Services	As & when required after office hours and weekends	

(b) The above-mentioned timings may be changed as per Employer's instructions. The Contractor shall follow the same pattern during the month of Ramadan or as may be directed by the Employer.

(c) The Contractor shall follow the general schedule given above for performing Services. However, the schedule shall not limit the Services performed by the Contractor, and the Contractor shall carry out such Services, as and when required immediately to keep the equipment covered under this Contract in good running condition. The Contractor's employee(s) shall also follow the instructions of Employer's representative and carry out all repairing / maintenance work as and when required / pointed out by the Employer's representative.

- (d) Contractor's staff shall mark attendance and Contractor shall provide stationeries, log book, log sheets etc and attendance register with proper binding for maintaining record and it shall be maintained properly.
- (e) Shifts shall be evenly rotated and Contractor shall prevent any irregularity.
- (f) Daily and periodic maintenance/checking for all lifts shall be carried out as per manufacturer's instructions or as per electrical handbook and shall also include (but not limited to) following service. Checklists and reports for the following work must be submitted to the Employer with their invoices.

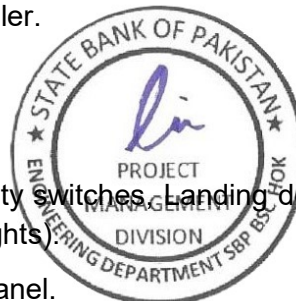
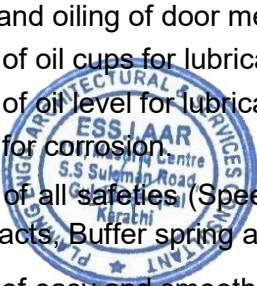
7. Frequency of Inspection:

(A) Daily Inspection Checklist

- (a) Check manufacturer's instructions;
- (b) Checking of Phase voltages.
- (c) Checking of operator panel for start.
- (d) Cleaning of lift cars.
- (e) Cleaning of doors.
- (f) Cleaning of sills.
- (g) Cleaning of floor of lift cars
- (h) Checking of lights and fans of lifts cars
- (i) Checking of intercom.
- (j) Checking of floor indicators.
- (k) Checking of call buttons
- (l) Checking of door functioning.
- (m) To Maintain log sheets and checklists.
- (n) Checking of all safeties (Speed Governor, Safety switches, Landing door, Car roof, door drive contacts, Buffer spring at pits, and counter weights).
- (o) Checking of electrical, electronic, mechanical and civil installations and report immediately to contractor's Rep and the Employer's representative about any abnormal condition.

(B) Weekly Inspection Checklist

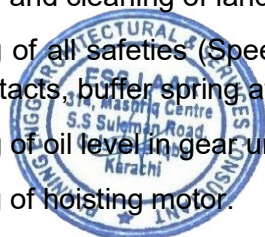
- (a) Check manufacturer's instructions;
- (b) Checking of Ampere load and phase voltages.
- (c) Checking of doors of lifts for any roll back or out of level condition.
- (d) Cleaning and oiling of door mechanism, door roller.
- (e) Checking of oil cups for lubrication.
- (f) Checking of oil level for lubrication of gears.
- (g) Checking for corrosion.
- (h) Checking of all safeties (Speed Governor, Safety switches, Landing door, Car roof, door drive contacts, Buffer spring at pits, counterweights).
- (i) Checking of easy and smooth running of door panel.



- (j) Checking of door mechanism including checking of rollers, up-thrust interlock, unlocking device, motor inspection, door control box.
- (k) Visual checking of parts installed in lifts machine rooms.
- (l) Cleaning of machine room.
- (m) Cleaning of pits and removal of trash.
- (n) Checking of relay contacts of control panel.
- (o) Inspect hoist motor, oil level and its bearing check.
- (p) Examine chain for free rotation with shaft.
- (q) Dust blowing with blower.
- (r) Observe operation of brake. Inspect drum and shoe clearance, clean and lubricate pivot points.
- (s) Observe operation including tension sheave of speed governor and check electrical switches for proper operation.
- (t) Check all sensors and safeties for operation. Test alarm bell and emergency stop switch.
- (u) Checking of electrical, electronic, mechanical and civil installations and report immediately to Contractor's engineer-in-charge and the Employer's representative about any abnormal condition.

(C) Monthly Inspection Checklist

- (a) Check manufacturer's instructions;
- (b) Inspect, clean, lubricate, and properly adjust all roller guides, guide rails, guide shoes and rail oilers.
- (c) Remove all dirt, dust, and oil from pits.
- (d) Check the operation of the emergency lights; replace as necessary.
- (e) Solid State Components and Circuit Boards: Inspect printed circuit board and other solid state devices for cleanliness, condensation spots, evidence of heating and deterioration. Check and replace defective solid state devices.
- (f) Inspect leveling operation. Clean and lubricate switches, vanes, and all other related parts. Adjust to obtain the proper leveling at all landings in both the UP and DOWN directions within $\frac{1}{4}$ inch above or below the landing sill.
- (g) Checking and cleaning of door tracks.
- (h) Checking and cleaning of landing door contacts.
- (i) Checking of all safeties (Speed Governor, Safety switches, Landing door, Car roof, door drive contacts, buffer spring at pits, and counter weights).
- (j) Checking of oil level in gear unit.
- (k) Checking of hoisting motor.
- (l) Checking of brake functioning.



- (m) Checking of steel ropes.
- (n) Cleaning and lubrication of speed governor.
- (o) Checking of oil in lubrication cup and refilling of cups if required.
- (p) Lubrication of chain links.
- (q) Cleaning the control panels for dust with blower.
- (r) Check the worm gear and thrust bearing and shaft for smooth operation.
- (s) Check the floor selector, door controller, door roller, controller and motor.
- (t) Inspect, clean, lubricate and manually operate safety mechanisms.

(D) Semi – Annually Inspection Checklist

- (a) Check manufacturer's instructions;
- (b) Inspect, clean, lubricate and manually operate safety mechanisms.
- (c) Completely dismantle brake assembly, clean, and inspect for wear. Replace defective parts required for proper operation. Where brake shoes are asbestos-containing, check for dust, and practice appropriate cleanup and maintenance precautions. Lubricate bearing, pins, and pivot points.
- (d) Thoroughly clean controller with blower or vacuum. Inspect and check the operation of switches, relays, timers, capacitors, resistors, contacts, overloads, wiring, connections, fuses and overload settings. Check for zone control, and load by-pass door failure time. Check programming up peak, down peak, off peak, off hours. Replace worn or defective parts and adjust controller for proper operation.
- (e) Clean, inspect, and lubricate all door operating mechanisms; including but not limited to rollers, up thrusts, interlocks, clutches, self-closer and sills. Replace worn or defective parts, repair and adjust door mechanisms as required for proper operation.
- (f) Clean rails, beams, and all related iron work in hoist way. Dust hoist way walls. Clean top, bottom, and sides of car. Clean counterweight and pit area.
- (g) Check oil level and operation of switches. Add oil or adjust switches as necessary for proper operation.
- (h) Checking of door reopening devices, stop switches, operating control devices, car floor and landing sill, car lighting, car emergency signal, car door or gate, door closing force, power closing of doors or gates, power opening of doors or gates, car vision panels and glass car doors, car enclosure, emergency exit, ventilation, signs and operating device symbols, rated load, platform area, and data plate, standby power operation, restricted opening of car or hoist way doors and car ride.
- (i) Checking of rope fastenings, terminal stopping devices, slack rope devices, governor, over speed switch & seal and car & counterweight safeties.
- (j) Checking car leveling devices; top emergency exit, counterweight safeties, traveling cables and junction boxes, door and gate equipment, governor rope, compensating ropes and chains.

- (k) Checking car platform guard, hoist way doors, vision panels, hoist way door locking devices, access to hoist way, power closing of hoist way doors, sequence operations, elevator parking devices, emergency doors blind hoist ways, and standby power selection switch.
- (l) Checking Pit access, lighting, stop switch, counterweight buffer and final terminal stopping devices, normal terminal stopping devices, traveling cables, governor-rope tension devices, compensating chains, ropes, and sheaves, car frame and platform, and car safeties and guiding members.
- (m) Checking of brakes and brake torque.
- (n) Checking and observation of slip of ropes and condition.
- (o) Checking all safeties (Speed Governor, Safety switches, Landing door, Car roof, door drive contacts, buffer spring at pits, counter weights).

(E) Annual Inspection Checklist

- (a) Checking standby power operation.
- (b) Check and torque all connections to correct specifications, and check and lubricate cooling fan; check primary and secondary voltages phase to phase and phase to ground and ampere load;
- (c) Checking traction sheaves; terminal stopping devices & switches, slack rope devices; governor, over speed switch, and seal; and counterweight and car safeties.
- (d) Drill for operation of elevators under fire and other emergency conditions.
- (e) Testing of the operation of the electrically released brake by manually operating the other safety devices and observing.
- (f) Testing speed governor safety by manually operating the trip mechanism.



PART B

OPERATION AND MAINTENANCE SERVICES FOR HVAC WORKS



SCOPE OF SERVICES

1. The Contractor shall be responsible for the operation of the complete HVAC System including the Plant Room, complete service & maintenance of all equipment controls, components and accessories including repair, preventive maintenance and annual overhauling and service.
2. The Contractor shall be responsible for operation & maintenance of complete HVAC system for a period of 546 days after issuance of Taking- Over Certificate. Cost of consumables including Electricity, Water, lubrication oil, grease, fuel, kerosene oil, grease, cotton, duster, cleaning brush, vacuum cleaner toolsetc. required for scheduled maintenance shall be borne by the Employer and the parts (under warranty) required for unscheduled maintenance or breakdowns will be provided by the Contractor.
3. The Employer shall be responsible for the following:
 - a) For proving the electricity, gas, water and other consumables as mentioned above.
 - b) Supply of Water treatment chemicals, lithium bromide, inhibitor, Alcohol, paints & special lubricants including greases or oils.
 - c) Provision of suitable office space within or close to the central plant room with a telephone extension from existing building for easy communication with the concerned officials of the Employer.
4. The Contractor shall be responsible for the following:
 - a) Providing the Supervisor, Plant operators, FCU/ AHU Technicians, Electricians, Helpers, tools, and instruments required for operation, regular and annual service, overhauling, maintenance & repairs etc.
5. Tools & Equipment:

The Contractor should keep the following minimum tools, equipment and calibrated instruments at site for carrying out the operation, maintenance and other jobs as per requirement. The list of tools/ equipment is mentioned below:

I	Instruments	Qty (Nos.)
1.	Multi-meters	2
2.	Tong Tester (AC/DC)	2
3.	Techo meter	1
4.	Anemometer	1
5.	Sling Psychrometer	2
6.	Thermo couple (digital) or Pyrometer (gun type)	1

II	Tools & Equipment	Qty (Nos.)
1.	Screwdriver set – all sizes	2
2.	Cutting pliers set – all sizes	2
3.	Nose pliers set – all sizes	2
4.	Cutter – all sizes	2
5.	Spanners set (DE, O.E, Ring & L-Key) - all sizes	2
6.	Socket set – all sizes	2
7.	Torque wrench	2
8.	Drilling machine (One Large size and One small Size)	2
9.	Vacuum cleaner – Industrial type	1
10.	Air blower – Industrial type	2
11.	Working tables	2
12.	Sitting chairs	4
13.	Grease Gun	2
14.	Torch lights (Big)	2
15.	Lead and soldering iron	2
16.	Water pressure pump	1
17.	Bearing puller (Big Size)	1
18.	Bearing puller (Small Size)	1
19.	High Pressure Washer	1
20.	Ladders	2
III	Personal Protective Equipment (PPE)	Qty (Sets)
17.	Safety shoes, Helmets, Safety Harness, Goggles, Respirator, Gloves, Ear plug, Ear Phones etc, one sets each per personnel to be provided by the Contractor.	1

To keep the plant room, adjoining areas, cooling tower terrace, A.H unit rooms neat & clean. Cleaning to be done every day.

6. The Contractor shall ensure that the air-conditioning plant is operated, maintained & serviced efficiently to avoid breakdown during normal operation. The Contractor shall also ensure economical consumption of the materials & spare parts supplied by the Employer. The spare parts not available in the stock shall be arranged/ purchased by the Contractor after obtaining approval from the Employer pending reimbursement of the cost on invoices/ bills/ cash memo. The Employer may also at its discretion make direct payment to the suppliers.
7. The following jobs shall be insured during the service period:
 - a) The temperature on each floor at different locations shall be recorded at least twice daily.
 - b) The equipment operational observation shall be recorded at suitable intervals.

- c) All readings shall be recorded in approved printed log sheets prepared in duplicate. One set would be supplied to the Employer's representative every day.
 - d) Daily Operation report shall be prepared and signed by Contractors Site Engineer in which all operational details will be written on a printed log book, supplied by Contractor on Employer's approved format.
8. The Contractor shall regularly submit a Monthly report in triplicate to the Employer Engineer In-charge up-to the 5th of each month regarding the overall performance of the complete plant during the preceding month and pinpoint any action to be taken by the Employer.
9. The Contractor shall submit an estimate to the Employer Engineer In-charge for approval before carrying out any major repairs which is not covered under this contract. The estimate shall be submitted expeditiously so as not to disturb the plant operation. The Contractor shall under take the work on approval by the Employer of the estimate indicating there in the extent up to which Employer should share the cost.
10. The Contractor shall be responsible for:
- a) Dosing water treatment chemicals for cooling tower.
 - b) Removal and fixing of false ceiling tiles as per original as required by the Contractor for carrying out his work. The Contractor shall be responsible for any damage to the false ceiling framing and tiles.
11. The frequency of Operation & Maintenance (O&M) works is briefly detailed in Para 11 through 17 for reference only without any limitation.

12. Plant Operation:

(I) Operation on Daily Basis:

- a) Check for the working of all electrical & mechanical components of the equipment.
- b) Dosing of chemical for treatment of cooling tower and chiller feed water system.
- c) Maintain log sheets/log book for daily operation.
- d) Any service or running repairs required during the operation of the plant.
- e) Cleaning of the equipment machinery and complete Plant Room.

(II) Weekly/ Bi-Weekly/ Monthly Service & Maintenance of Plant:

- a) Washing & cleaning of air filters.
- b) Flushing and cleaning of strainers.
- c) Service of automatic and safety controls of equipment and air conditioning system.
- d) Checking of oil and other lubricant levels and changing.
- e) Checking of belt driven equipment and adjustment of belt tension and alignment.
- f) Checking of water levels and controls valves.
- g) Changing of parts due to normal wear and tear when necessary.

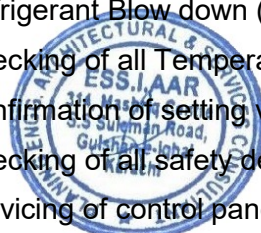
- h) Checking and adjustment of all pressure and safety devices.
- i) Adjustment and lubrication/ greasing of bearings & glands of equipment.

(III) Annual Maintenance

The work to be carried out one by one on chillers between December 15 to February 15 during the operation & maintenance period. Parts to be changed where necessary. Instruction given in the Manufacturer's Manuals to be followed. Record of various checks and tests to be maintained for further reference. A satisfactory report on annual maintenance will be provided to the Employer's Engineer.

(IV) Annual Servicing

- a) Pressure checking of Chiller with N2 (N2 will be provided by the Employer)
- b) Servicing of Purge Pump
- c) Checking & Servicing of Absorbent pump.
- d) Checking & Servicing of Refrigerant pump.
- e) Servicing of Burner
- f) Checking and Servicing of H.T. Generator Eliminators
- g) Servicing of Generator
- h) Servicing of Suction Port of Burner Checking of Damper Motor of Burner
- i) Checking of Burner Flame (Visual Inspection)
- j) Checking of Gas Pressure
- k) Checking of Diesel Line
- l) Checking of Butterfly Valve of Burner
- m) Flame Adjustment
- n) Adjustment of Air Damper and Gas Damper
- o) Servicing of Gas Line Strainer.
- p) Servicing of Diesel Line Strainer.
- q) Restarting of chiller with observation.
- r) Cycle testing of LiBr Solution
- s) Calibration of sensors (if found faulty will inform accordingly)
- t) Level Electrode
- u) Vacuuming
- v) Refrigerant Blow down (If necessary).
- w) Checking of all Temperatures, Pressures and Fluid level.
- x) Confirmation of setting values of safety devices and control devices.
- y) Checking of all safety devices and adjustment if required
- z) Servicing of control panel



- aa) Checking programming of Microprocessor
- bb) Checking and adjustment of Inverter Programming.
- cc) Checking Amp. and abnormality of :-
- dd) Absorber Pump
- ee) Refrigerant Pump
- ff) Vacuum Pump
- gg) De-scaling of Absorber and Condenser with De-scalar
- hh) Neutralization with Neutralizer.
- ii) Brushing with brushing Machine

13. Cooling Tower Operations:

(I) Operations on Daily Basis:

- a) Complete overall visual inspection to make sure that all equipment is operating and that safety systems are in place.
- b) Inspection of Cooling Tower circulating water Circuit.
- c) Chemical Dosing.
- d) Checking of PH & TDS of cooling water circuit.
- e) Checking Ampere of cooling tower motor.
- f) Fan Balancing & Adjustment if required.
- g) Checking of float valve of cooling towers for proper operation or leakage.

(II) Operations on Weekly / Monthly Basis:

- a) Complete overall visual inspection to make sure that all equipment is operating and that safety systems are in place.
- b) Inspection of Cooling Tower circulating water Circuit.
- c) Servicing of Hot & Cold Water basin.
- d) Checking of float valve of cooling towers for proper operation or leakage.
- e) Checking of motor supports and fan blades.
- f) Ensure that the strainers at water return sump to chiller are in position and clean.
- g) Ensure that air intake louvers are clear, properly fixed, clean and not obstructed.
- h) Ensure that there is no oil leak from the fan gear or bearing box. Ensure that Fan-Belts are in good operating condition and belt tension is correct
- i) Ensure that the top water basin distribution holes are clear, clean and not obstructed.
- j) Check all globe valves on top basin for proper adjustment for required flow GPM.



(III) Annual Servicing

- a) Complete overall visual inspection to make sure that all equipment is operating and that safety systems are in place.
- b) Inspection for clogging.
- c) Checking the condition of Fan Motor.
- d) Check for loose fills, connections, leaks, etc.
- e) Check motor supports and fan blades.
- f) De-scaling of Cooling Towers.
- g) Charging of Water Treatment Chemicals. (Chemicals will be Provided by Employer)
- h) Inspections of Cooling Tower circulating water Circuit.
- i) Repairing, if any leakage in the system (Material will be provided by Employer).
- j) Checking of float valve of cooling towers for proper operation or leakage.
- k) Ensure fan gear and bearing box is well lubricated.

14. Water Pumps Operations:

(I) Operations on Daily / Weekly

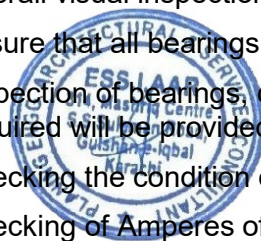
- a) Checking the condition of the motor.
- b) Checking and securing of all pump mountings.
- c) Checking Amperes of Pumps.
- d) Check and inspection for any abnormal noise.

(II) Operations on Monthly Basis

- a) Overall visual inspection.
- b) Assure that all bearings are lubricated.
- c) Inspection of bearings, drive, pulley & gland rope. Adjust, repair or replace new material (if required will be provided by Employer).
- d) Checking the condition of the motor.
- e) Checking of Amperes of Pumps.
- f) Check and inspection for any abnormal noise.

(III) Annual Servicing

- a) Overall visual inspection.
- b) Assure that all bearings are lubricated.
- c) Inspection of bearings, drive, pulley & gland rope. Adjust, repair or replace (if required will be provided by Employer).
- d) Checking the condition of the motor.
- e) Checking of Amperes of Pumps.



- f) Check and inspection for any abnormal noise

15. Air Handling Units (AHUs) Operations

(I) Operation on Daily Basis

- a) Checking of any abnormality in normal operation condition.
- b) Checking & Servicing of Filters.
- c) Humidity control
- d) Checking of Coil's condition.
- e) Checking of Blowers and housing.
- f) Checking of the drain pan for smooth and proper flow of condensate.

(II) Operations on Weekly / Monthly Basis

- a) Overall Visual Inspection
- b) Checking & Servicing of Filters.
- c) Inspection of Fan & Fan motor
- d) Checking of Blowers, belts and Temperature, Dampers, Valves & Pressure Gauges.
- e) Checking of the drive motor.
- f) Checking of the drive and driven pulley alignment.
- g) Checking of the drain pan for smooth and proper flow of condensate

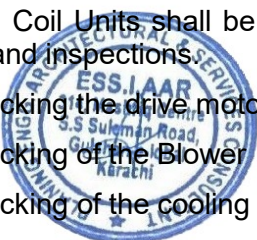
(III) Annual Servicing

- a) Overall Visual Inspection
- b) Checking of Coil's condition.
- c) Inspection of Fan & Fan motor.
- d) Checking of Blowers, belts and Temperature & Pressure Gauges.
- e) Greasing of bolts & Motors. (upon requirement)
- f) Servicing of Coils. (upon requirement)
- g) Checking of the pipe work, pipe insulation
- h) Checking of the electrical connections of the AHU Drive Motor that these completely tightened grounded and insulated.

16. Fan Coil Units (FCUs) Operations:

The Fan Coil Units shall be maintained and Operated based on the following regular checks and inspections

- a) Checking the drive motor for proper operation, amps drawn, voltage etc
- b) Checking of the Blower
- c) Checking of the cooling coil



- d) Checking of pipe work and pipe insulation
- e) Checking of valves, strainers,
- f) Checking of filters checking of controls, motorized valve, thermostat
- g) Checking of the drain pan for smooth flow of condensate
- h) Checking the noise level
- i) Checking the abnormal vibration.

17. Electrical Motors & Starters Operations:

- a) Cleaning and checking of all components.
- b) Tightening of wire connections.
- c) Cleaning & adjustment of contacts.
- d) Checking of earthing.
- e) Checking of motor winding insulation.
- f) Replacement of bearings (if needed)

18. List of Staff for Operation & Maintenance of HVAC System

The particular of the suggested staff along with their qualifications and experience that who shall be deputed at the plant is as under:

S#	Description	Quantity	Minimum Qualification
1	Supervisor	01	DAE in relevant field with minimum 08 years relevant experience
2	FCU/AHU Technician	01	Matriculation with minimum 03 years relevant experience
3	Plant Operator	01	Matriculation with minimum 03 years relevant experience of Plant Operation
4	General Fitter	01	Matriculation with minimum 05 years relevant experience
5	Helper	02	minimum 03 years relevant experience

Important Notes:

- a) In case of irregular attendance of the Contractor's staff, the monthly charges would proportionately be deducted.
- b) The Contractor must ensure that work of service & maintenance is satisfactorily completed if necessary by the extending the working hours of his staff or by deputing more staff for the work.
- c) The Contractor's staff should be in complete uniform with safety shoes during working hours
- d) All the staff will be interviewed/ tested by Employer, upon satisfaction staff will be allowed to work at site.

- e) Contractor shall be responsible for the performance of their deputed staff, in case of un-satisfactory performance/behavior, the Contractor will provide the replacement of the individual within a week.
- f) Contractor shall be responsible for making payment to wages /salary to staff as per the applicable labor laws deduction or applicable taxes.
- g) Contractor shall be responsible for the security clearance of their staff before deputing at SBP Main Building and other related premises in accordance of procedure of Internal Employer Security Department (IBSU OR IBSD).

19. Special Terms & Conditions

- a) The Contractor shall be responsible to operate the A.C Plant and provide maintenance/ service facilities for the same to ensure uninterrupted/ trouble - free operation and smooth service. In case of any fault in A.C Plant, the same shall be attended and removed promptly by the Contractor. The Contractor shall also be responsible for the complete periodical & preventive maintenance of the equipment, components and accessories including annual overhauling etc. the scope of work is detailed above, while the list of equipment installed is given below at **Annexure-II/C/B**.
- b) The Contractor shall be responsible for the operation of the A.C plant and providing the effective air- conditioning and the connected mechanical services in the building. The plant will be operated on round the year basis. The cooling and ventilation required in the building would depend on the weather conditions which will be decided at the discretion of the Employer, **Normally the plant will be operated from Monday to Thursday (07.30 A.M to 05.30 P.M) except Friday (7:30 A.M to 6:00 P.M) and Saturday (9:00 A.M to 5:00 P.M) according to weather conditions. The weekly/ monthly service and maintenance will be carried out on Saturday and plant will be operated only on requirement of Employer.** Further for providing effective air-conditioning, the timings and the dates of the operation of the plant may be reviewed by the Employer at any time as per requirement of the weather conditions.
- c) For the Operation, Service, Maintenance and Overhauling of the plant, the Contractor shall depute his staff who should have sufficient qualification and experience in their respective trades. The staff must remain at the site of work exclusively in the building and shall not be diverted to Contractor's other installations during the operation, maintenance, service and overhauling, if any, of the plant is carried out.
- d) The periodical and preventive maintenance/service of the plant and allied equipment shall be carried out on weekly/bi-weekly/monthly/yearly etc. basis and as per the service manuals of the manufactures in presence of the Employer's representative and details of these shall be duly entered in the daily log sheets/book. The Contractor shall complete the annual overhauling, maintenance, repairs and service during this period so that the plant is in full working order before the next operation of the cooling cycle.
- e) The Contractor shall attend the maintenance or repairing work on priority basis even after office hours or on the holiday(s)/Sunday(s) if so warranted at any time due to exigencies/ emergencies and will put the air conditioning plant and other mechanical services on smooth operation in the minimum possible time. The Contractor's site

engineer shall inform the Employer's Engineer In-charge well in advance about any maintenance/ repair/service work scheduled to be done by the Contractor after office hours or on Sunday(s)/Holiday(s) so that necessary security arrangement and access for the Contractor's staff be made by the Engineer In-charge.

- f) The entire work shall have to be carried out as per the professional codes and instructions and with required skilled labor/ technicians / mechanics etc. in accordance with the service manuals of the suppliers. The Contractor shall not be allowed to sublet the work to any third party.
- g) The Contractor shall take full responsibility to advise the Employer's Engineer In-charge well in advance regarding the parts anticipated to be required for the maintenance purpose, so that they may be procured well in time if not available in store. The complete list of such materials and parts required for quarterly/semi-annually and annual maintenance or overhauling shall be submitted by the Contractor to the Employer's representative before **two months** for their procurement.
- h) The Contractor shall be required to confirm the availability of imported and indigenous spare parts at engineering stores of the Employer. If any additional spare parts are required, the Contractor will submit a list of the same to the Employer's Engineer In-charge giving three months' time for procurement of the imported spare parts and 4 months' time for indigenous spare parts.
- i) The Contractor shall ensure that the spare parts etc. are replaced only when it is considered essential. Maximum care would be exercised for economy and all efforts should be made to repair the old parts for its reuse. New part should only be substituted when old part cannot be satisfactorily repaired. Before replacement of any spare part approval should be obtained from the Employer's representative and the old/ replaced part will be returned to the Employer under proper receipt of the In-charge of Employer's Engineering store.
- j) The observation for equipment operation and temperature record for the occupied areas of the building shall be noted at regular intervals in approved printed Log sheets. One set of Log sheets should be submitted to the Employer's Engineer In-charge on the same day.
- k) The Contractor must ensure the proper function of the plant. In case of unsatisfactory functioning or failure of the plant on account of the negligence of the Contractor, of which the Engineer In-charge shall be the sole judge, the Employer's shall have the right to terminate this agreement by giving a one month written notice.
- l) In case any equipment or part of the plant is damaged or destroyed as a result of negligence on the part of the Contractor, his agent or employees, of which the Employer's Engineer In-charge shall be the sole judge, the Contractor shall be liable to pay for rectification and to make good all such damages or losses at his own cost.
- m) Any defect or damages should have to be rectified by the Contractor at his own cost failing which the work will be executed through any other agency at Contractor's risk and cost.

- n) The Contractor will provide the two sets of proper uniforms to their staff including the in-charge, the uniform should be preferably safari suit type, the design and sample of the cloth should pre-approved from Employer's representative with proper identification tags/ name plates, with proper company name mentioned on the uniform. If any of the worker is found without uniform or without name tag a penalty of the Rs. **500/-** (Rupees five hundred only) per person will be imposed.
- o) The Contractor shall be responsible for the safety of their staff during any work and the Contractor will ensure all the safety measures before undertaking any job.
- p) The Contractor shall provide the CVs of all the staff. No staff of the Plant can be inducted without the prior approval of the Employer's representative.



Daily Preventive Maintenance Report for Electric Water Cooled Screw Type Chillers

Chiller Make: _____		Chiller No: _____		
Capacity: _____		Date: _____		
Sr. No.	Check Points	Observation	Issues	Action Taken
1	Visual Inspection of compressor for any unusual noise			
2	Checking the control panel of the chiller from dust and other external material which could be harmful for chiller controls.			
3	Checking of Chilled water outlet temperature (Standard 7°C)			
4	Checking of Chilled water inlet temperature (Standard 12 °C)			
5	Check the chilled water outlet pressure			
6	Check the chilled water inlet pressure			
7	Checking of all electrical connections			
8	Check for unusual noise from pumps			
9	Check the chiller for dust, debris buildup which could harm the equipment			
10	Perform chemical testing of system water.			

Signature of Contractor Supervisor
Rep

Signature of Employer

Note: The values mentioned above may be changed as per design parameters. These Inspection Tasks are as per ANSI/ASHRAE/ACCA Standard 180-2018.



Weekly Preventive Maintenance Report for Electric Water Cooled Screw Chillers

Chiller Make: _____		Chiller		
No: _____		Date:		
Capacity: _____				
Sr. No.	Check Points	Observation	Issues	Action Taken
1	Check Oil Level in Oil Separator Sight Glass. (Should be half filled)			
2	Check Liquid Line Sight Glass/ Moisture Indicator.			
3	Check refrigerant level in the Evaporator Sight Glass while running full load for 10 to 15 minutes.			
4	Record System Operating Temperatures & Pressures.			
5	Check Condenser Coils for dirt / debris and clean as necessary.			

Signature of Contractor Supervisor
Rep

Signature of Employer

Note: These Inspection Tasks are as per ANSI/ASHRAE/ACCA Standard 180-2018.



Quarterly Preventive Maintenance Report for Electric Water Cooled Screw Type Chillers

Chiller Make: _____		Chiller		
No: _____		Date: _____		
Capacity: _____				
Sr. No.	Check Points	Observation	Issues	Action Taken
1	Check programmable Operating Set points and safety cutouts. Assure they are correct for the application Confirmation of setting values of safety devices and control devices.			
2	Check Compressor and Evaporator Heater Operation			
3	Check for refrigerant leaks using a halogen detector or similar testing device. Repair all leaks before recharging unit.			
4	Check for dirt in the panel			
5	Check condition of cooling coil and heating coil. Use fins to straighten fins			
6	Inspect gearbox for excessive wear.			

Signature of Contractor Supervisor
Rep

Signature of Employer

Note: These Inspection Tasks are as per ANSI/ASHRAE/ACCA Standard 180-2018.



Semi-Annually Preventive Maintenance Report for Electric Water Cooled Screw Chillers

Chiller Make: _____		Chiller		
No: _____		Date: _____		
Capacity: _____				
Sr. No.	Check Points	Observation	Issues	Action Taken
1	Leak check the chiller using NITROGEN GAS			
2	Check Compressor oil level.			
3	Run machine, check action of controls, relays, switches, etc., to see that: 1) Compressors run at proper settings. 2) Reheat coils activate properly. 3) Humidistat activates humidifier. 4) Suction and discharge pressures are proper. 5) Discharge air pressure is set properly. 6) Check control system and devices for evidence of improper operation. 7) Check variable-frequency drive for proper operation.			

Signature of Contractor Supervisor
Rep

Signature of Employer

NOTE: These Inspection Tasks are as per ANSI/ASHRAE/ACCA Standard 180-2018.



Annual Preventive Maintenance Report for Electric Water Cooled Screw Type Chillers

Chiller Make: _____		Chiller No: _____		
Capacity: _____		Date: _____		
Sr. No.	Check Points	Observation	Issues	Action Taken
1	Check the compressor oil for viscosity			
2	Disconnect Power Source and lock Out, Check tightness of Power wiring Connections.			
3	Check and tighten any loose unit electrical terminals, disconnect switches, or connectors.			
4	Check and adjust vibration eliminators. Replace if required.			
5	Check Glycol concentration on Low Temp. or other applications where freezing maybe a problem.			
6	Painting of the equipment and auxiliary components			
7	Check control box for dirt, debris, and/or loose terminations.			
8	Check motor contactor for pitting or other signs of damage.			
9	Check refrigerant system pressures and/or temperatures.			
10	Check open drive couplings, bearings, and seals for evidence wear or alignment problems.			
11	Check for evidence of build-up, fouling, corrosion, or degradation on heat exchange surfaces.			
12	Check for proper fluid flow and for fluid leaks.			
13	Check compressor oil level and/or pressure on refrigerant systems having oil level and/ or pressure measurement means.			
14	Assess field-serviceable bearings.			

Signature of Contractor Supervisor
Rep

Signature of Employer



Weekly Preventive Maintenance Report for Air Handling Unit

AHU Make: _____		Location: _____		
Capacity: _____		Date: _____		
Sr. No.	Check Points	Observation	Issues	Action Taken
1	Check the cooling coil, if needed wash.			
2	Check for particulate accumulation on filters.			
3	Check the rotation of blower wheel.			
4	Check blower fans for dust buildup and clean as per requirement.			
5	Check all the electrical connections and control devices for evidence of any improper operation.			
6	Check for excessive vibration of AHU.			
7	Check the condensate pan, drain line and P-trap and cleanout if necessary.			
8	Check for any air leaks.			
10	Check for cleanliness and tidiness of the unit and its surroundings.			
11	Check the sound of motor and blower.			
12	Check all the lights of AHU room are working properly.			

Signature of Contractor Supervisor
Rep

Signature of Employer

Note: These Inspection Tasks are as per ANSI/ASHRAE/ACCA Standard 180-2018.



Monthly Preventive Maintenance Report for Air Handling Unit

AHU Make: _____		Location: _____		
Capacity: _____		Date: _____		
Sr. No.	Check Points	Observation	Issues	Action Taken
1	Check for outdoor pollution. No pollution sources w/i 20 ft. (e.g. dumpster, chimney stack)			
2	Check whether louvers and access doors are working properly			
3	Clean the air filters			
4	Check whether dampers operate properly without any obstruction			
5	Check AHU plenum for excess dirt			
6	Check AHU insulation whether its clean and secure			
7	Check whether coils are clean			
8	Check whether access to cooling coils is proper			
9	Check whether no excess condensation problem exist			
10	Check condensate pan and drain line for: No noticeable odor? No visible bacterial or fungal growth? Clean, no residue, no standing water? No overflow, no leakage, no blockage, no damage? Proper slope, drain line ok, drainage acceptable, discharge ok?			
11	Check condition of fan and motors for: No unusual odors, noise, or vibration? RPM and heat acceptable? Wiring, voltage, and amp OK??			
12	Check the condition of ducts for no odors, noise or vibration? Clean, no obstructions, debris? No signs of moisture/mold, insects or rodents? No noticeable air leaks?			
13	Check plenum for No odors, noise or vibration? Clean, no obstructions, debris? No signs of moisture/mold, insects or rodents? No noticeable air leaks?			

Signature of Contractor Supervisor
Rep

Signature of Employer

Note: These Inspection Tasks are as per ANSI/ASHRAE/ACCA Standard 180-2018.



Quarterly Preventive Maintenance Report for Air Handling Unit

AHU Make: _____		Location: _____		
Capacity: _____		Date: _____		
Sr. No.	Check Points	Observation	Issues	Action Taken
1	Clean the air filters with water.			
2	Clean the cooling coils and drain pan			
3	Check for wear of belts and their tension and alignment			
4	Check all electrical terminals are okay			
5	Check the tightening of mounting bolts			
6	Check motor contactor for pitting or other signs of damage.			
7	Check return and supply ducts for contamination and deterioration			
8	Check the duct insulation			
9	Check plenum for No odors, noise or vibration? Clean, no obstructions, debris? No signs of moisture/mold, insects or rodents? No noticeable air leaks?			
10	Painting of the equipment and auxiliary components (On annual basis only)			
11	Check blower blades and housing.			
12	Check for fin damage and evidence of fouling on the evaporator coil.			
13	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.			
14	Inspect exposed ductwork for insulation and vapor barrier for integrity.			
15	Check the strainer for clogging.			

Signature of Contractor Supervisor
Rep

Signature of Employer



Cooling Tower Maintenance Checklist (Frequency: Quarterly)

Date: _____ Time: _____

Name of the Building: _____

Cooling Tower Detail: _____

S#	Description	Status	Remarks
1	Overall Visual Inspection		
2	Checking Water Circuit		
3	Servicing of hot and Cold Water Basin		
4	Check Motor Supports and Fan Blades		
5	Fans & Fan Belts		
6	Motor Bearing and Motor Noise		
7	Fan Alignment and Vibrations		
8	Nozzles Checking and Cleaning		
9	Checking Doors, Support, Ladders		
10	Bearings, Electrical and Water Connections		
11	Inspection for Clogging		
12	Check for loose fills/fins, connections, leaks etc		
13	Check DDC Controllers including their electrical connections, thermostat, switching on and off with set temperature.		
14	Inspect blowdown or drain valve		
15	Check chemical injector device. Verify water treatment target levels are being maintained		
16	Check for fouling, corrosion, degradation, or dirt/debris accumulation on or in sump and strainer, wet decks, fill, nozzles, and exterior louvers.		

Remarks: _____

Signature of Contractor Supervisor
Rep

Signature of Employer

Note: These Inspection Tasks are as per ANSI/ASHRAE/ACCA Standard 180-2018.

Cooling Tower Maintenance Checklist (Frequency: Annually)

Date: _____ Time: _____

Name of the Building: _____

Cooling Tower Detail: _____

S#	Description	Status	Remarks
1	Inspect louvers for correct position and alignment, missing or defective items, and supports.		
2	Inspect condition of doors and hinges		
3	Inspect stairways including handrails, structure and fasteners for rot, corrosion, security and acid attack.		
4	Ladders must be checked for corrosion, rot, etc.		
5	Inspect the distribution system piping for decay, rust, or acid attack. Check the condition and tightness of connections		
6	Inspect tower fill for damage deterioration and missing		
7	Inspect the nuts and bolts in partitions for tightness and corrosion.		
8	Check all sumps for debris, condition of screens, antitubular plates, and freely operating drain valves.		
9	Examine interior structural supports. Test columns, girts, and diagonal wood members for soundness by striking with a hammer.		
10	Check alignment of motor, fan and belt		
11	Inspect bearings, belts, and pulleys for excessive noise, wear or cracking, alignment, vibration, looseness, surface glazing, tension. Replace or repair as required.		
12	Check hubs and hub covers for corrosion, and condition of attaching hardware.		
13	Inspect blade clamping arrangement for tightness and corrosion.		
14	Check electric motor for excessive heat and vibration. Lubricate all motor bearings as applicable. Remove excess lubricant.		
15	Look for excessive play of the fan shaft bearings by applying a force up and down on the tip of a fan blade.		
16	Check amps and volts at operating loads		
17	Painting of the equipment and auxiliary components		
18	Check control box for dirt, debris, and/or loose terminations.		
19	Check motor contactor for pitting or other signs of damage.		
20	Check for proper fluid flow and for fluid leaks.		

Remarks: _____

Signature of Contractor Supervisor

Signature of Employer Rep

Note: These Inspection Tasks are as per ANSI/ASHRAE/ACCA Standard 180-2018.

Monthly, Quarterly, Annually Preventive Maintenance Report for Fan Coil Unit

FCU Make: _____		Location _____		
Capacity: _____		Date: _____		
Sr. No.	Check Points	Observation	Issues	Action Taken
1	Visual inspect the air filters for cleanness or replacement.			
2	Check the cooling coil, if needed wash			
3	Check the unusual noise and vibration from blower			
4	Check the blower fan for dust buildup			
5	Check the tightening of mounting bolts			
6	Cleanout condensate, drain line and clean condensate pan			
7	Check the sound of motor and tighten all electrical connections			
8	Check the condition of the strainer and wash it when clogged			
9	Check the Motorized Valves for proper operation			
10	Check for damage or evidence of leaks on the chilled-water-coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces. Clean and restore as needed to ensure acceptable condition. Find and record the location of identified leaks.			
11	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.			

Signature of Contractor Supervisor

Signature of Employer Rep

NOTE: These Inspection Tasks are as per ANSI/ASHRAE/ACCA Standard 180-2018.



Monthly, Quarterly, Annually Preventive Maintenance Report for Split Ac Unit

Split AC Make: _____				Location _____	
Capacity: _____				Date: _____	
Sr. No.	Check Points	Observation	Issues	Action Taken	
1	Visual inspect the air filters for cleanness or replacement.				
2	Check the evaporator coil, if needed comb the fins and wash the coil				
3	Check the unusual noise from blower				
4	Check the blower fan for dust buildup				
5	Check the tightening of mounting bolts				
6	Check the condenser coil to determine if it needs cleaning				
7	Visually inspect the compressor and check its ampere				
8	Check refrigerant pressure from suction(50-70 Psig Running Pressure for R 22 and 120-140 Psig Running pressure for R410A) and refill if necessary				
9	Cleanout condensate, drain line and clean condensate pan				
10	Check the sound of motor and tighten all electrical connections and check amperage and voltage				

Signature of Contractor Supervisor

Signature of Employer Rep

Note: These Inspection Tasks are as per ANSI/ASHRAE/ACCA Standard 180-2018.

(ANNEXURE-IIC/B)**LIST OF EQUIPMENT AND MACHINERY**

S#	Description of Equipment	Qty (Nos./Lot)
1.	300 TR Electric Operated Water Cooled Screw Chiller	1
2.	Cooling Tower	1
3.	Chilled / Hot Water Pumps	6
4.	Condenser Water Pumps	2
5.	Hot Water Heater	1
6.	Air Handling Units with motor and accessories	12
7.	Fan Coil Units (Cassette Type, wall mounted type) with motor and accessories	3
8.	Fans (cabinet, Propeller & Centrifugal type etc)	37
9.	Split ACs	29
10.		
11.	Expansion Tank	1
12.	Electric automatic controls and panels for central plant- equipment Complete, with all accessories, electric/ electronic type automatic humidity Temperature, Dosing Pumps & other controls for air handling and fan coil units (Lot).	1
13.	Piping systems for chilled, condenser water. Complete with all accessories and Insulation, including valves, fitting, gauges, thermometers, strainers and accessories etc. (Lot).	1
14.	Air distribution system comprising air ducts, air devices, air vents, fire dampers and volume control dampers complete with accessories and insulation (Lot).	1

