

**JKR CAWANGAN KEJURUTERAAN MEKANIKAL  
NEGERI PULAU PINANG**

**PENENTUAN**

**BAGI**

**KERJA-KERJA PENYELENGGARAAN BULANAN  
SISTEM PENYAMAN UDARA**

**DI**

**MASJID NEGERI, PULAU PINANG.**



**KETUA PENOLONG PENGARAH  
(MEKANIKAL)  
JKR CAW.KEJURUTERAAN  
MEKANIKAL PULAU PINANG**

**MEI 2013**

MONTHLY SERVICING, MAINTENANCE THREE (3) UNIT 20HP CARRIER CHILLER & SPLIT UNITS AIR CONDITIONING AT MASJID NEGERI PULAU PINANG.

1. **GENERAL.**

- a. This specification shall cover all service and maintenance work to be carried out for a period of **TWENTY FOUR (24)** calendar months on Three (3) units 110 RT Carrier chiller, split units and all equipment comprising the complete Chiller System at Masjid Negeri, Pulau Pinang.
- b. This servicing and maintenance work shall include the supply of all materials, appliances, labour and necessary incidentals. All works shall be performed in accordance with the best commercial practice and must be in strict accordance to this specification.
- c. The Contractor shall have in his employment, skilled workmen and technicians to carry out the servicing and repair work. Such workmen shall be expected to perform quality works in accordance to good engineering practice and to the satisfaction of the S.O.
- d. All materials to be supplied in connection with the work shall be new and unused and shall in general be of the best quality as regards to manufacture and performance.
- e. The Contractor shall provide a LOG BOOK in the plant room to record date, time and details of each maintenance service performed. The telephone number of the Contractor's service station shall be entered into this recode book to facilitate emergency service calls.
- f. The normal daily function of starting. Operating and stopping of the Chiller System will not be included in the maintenance service. However it shall include emergency services when call upon.

2. **LIST OF EQUIPMENT.**

- a. The Contractor shall service and maintain the list of equipment for Chiller System at Masjid Negeri, Pulau Pinang as listed below:-
  - i Three (3) units 110 RT Carrier Chiller.
  - ii Five (5) units Air Handling Unit (AHU).
  - iii Fourty Two (42) split units.
  - iv One (1) Main Switchboards.

3. **DESCRIPTION OF WORK.**

The Contractor shall be required to carry out but not limited to the works described below :-

- a. All machinery and equipment comprising the complete Chiller System and Ancillary Equipment under this specification shall be serviced and maintained strictly in accordance with the Service and Maintenance Schedule as set out below and / or in accordance with the manufacturer's recommendations.
- b. The Contractor shall advise the S.O. of any defects in any part of the complete Chiller system and Ancillary Equipment observed during the routine inspection and service and shall repair such defects if required to do so by the S.O.
- c. The Contractor shall provide emergency repair services during normal office hours and also during overtime hours if required to do so by the S.O. without incurring additional expenses on the part of the S.O.
- d. The Contractor shall keep a log book in the main plant room to check the performance of the Chiller System and the Ancillary Equipment.

4. **SERVICING AND MAINTENANCE SCHEDULE.**

The Contractor shall inspect and service all machinery and equipment comprising the complete Chiller System and Ancillary Equipment under this specification at least once a month except where otherwise directed by the S.O.

At each such monthly inspection and service of the complete Chiller System and Ancillary Equipment, the Contractor shall carry out the periodic servicing and maintenance routine in strict accordance with the manufacturer's recommendations and the work detailed below.

- i. Inspect all refrigerant compressors and refrigeration system and
  - a. Check the whole refrigeration circuit for leaks with a standard halide gas leak detector and rectify as necessary.
  - b. Check all refrigerant and oil levels and charge correct amount and proper type of refrigerant and lubrication oil into system as necessary.
  - c. Inspect V-belts and pulleys for sign of abnormal wear or pulley misalignment. Adjust or replace worn-out parts as necessary and maintain proper belt tension by necessary adjustment.
  - d. Check for oil leak around packing and tighten packing glands sufficiently to prevent leakage only.
  - e. Check the operation of all safety devices as relief valves and clean, adjust

- and lubricate as necessary.
  - f. Check the operation of all refrigerant controls such as that of expansion valves, pressure switches, thermostatic gas-filled bulbs and lubricate as necessary.
  - g. Check the suction and discharge pressure of all refrigerant compressors and if abnormal, trace the faults and rectify as necessary. Test cutting in and out points by proper adjustment of pressure control switches.
  - h. Check all bolts and nuts for tightness and tighten as necessary especially foundation bolts for compressors.
  - i. Check condition of vibration isolators of compressors and if faulty, rectify or replace as necessary.
  - j. Check strainers installed on refrigerant lines and clean if necessary.
  - k. Check for knocks, abnormal noise levels and excessive vibration in compressors and rectify as necessary.
  - l. Purge system of air and non-condensable gases by following manufacturer's instructions.
- ii Inspect all air handling and fan coil units, and
- a. Check all air filters and clean or replace as necessary.
  - b. Check all cooling coils seals, fittings, connections and pipeline for leaks and rectify as necessary.
  - c. Purge air and non-condensable gases from all cooling coils by adhering to manufacturer's instructions.
  - d. Check all fan bearings and lubricate with oil or grease as necessary.
  - e. Inspect belts and pulleys for wear and check tension of belting and adjust as necessary.
  - f. Check the operation of automatic water regulating valves and clean, adjust and lubricate as necessary.
  - g. Clean all the condensate pans, tray and drains and also operation of drain pipes especially the traps. Rectify any leakage or corrosion as necessary.
  - h. Clean cooling coils to remove accumulated dirt and other foreign matter by washing with caustic soda solution and rinsing thoroughly with clean water.
  - i. Check condition of electric reheat coils, remove scale and products of oxidation from surface and replace damaged insulation as necessary.
  - j. Check surface of casing for signs of corrosion and retreat or repaint as necessary.
  - k. Check insulation and vapour barrier on casing and repair or replace as necessary.
- iii Inspect all electric motors, and
- a. Check all motor bearings and lubricate with oil or grease as necessary.
  - b. Check commutator for presence of so-called commutator and polish with fine sand papers as necessary.
  - c. Clean dust and dirt from all current carrying parts and from insulation.

- d. Clean all cooling air passages and external fins and retreat or repaint motor casing as necessary.
  - e. Check starter contact are free from arcing during starting cycle and rectify as necessary.
  - f. Check all safety devices, such as overcurrent protection devices fitted and clean, adjust and lubricate as necessary.
- iv. Inspect all condensers, and
- a. Check coils, connections, fittings and pipeline for leakage and rectify as necessary.
  - b. Check casing for signs of corrosion and rectify as necessary.
  - c. Purge air and non-condensable gases from coils by following manufacturer's recommendations.
  - d. Check condition and operation of safety devices such as relief valves and clean, adjust and lubricate as necessary.
- v. Inspect and check the routine operation of all electrical starters, electrical control gears, ancillary electrical apparatus, temperature control gears, relay, and
- a. Clean, adjust and lubricate all bearings, pivots and other moving parts as necessary.
  - b. Check and clean electrical contractors and fuses as necessary.
  - c. Check contact points of contactors and relays for wear or pitting and for arcing during operation and rectify as necessary.
- vi. Check the performance of the complete Chiller Plant and Ancillary equipment and perform the necessary adjustments.
- vii. Check operation and condition of all valves in system and inspect corresponding flange, welded, soldered or screwed connections for leakage and rectify as necessary. For leaking valves tighten packing gland or nut or replace packing or stem as necessary. Examine valve seats and if pitted, grind with fine abrasive to alleviate leakage.
- viii. Half Yearly Tasks
- a. Check all direct-expansion refrigeration systems for operating pressures, temperatures, undue vibration, refrigerant leaks, also cleanliness of condenser fans.
  - b. Arrange for a specialist inspection and check-up of the automatic control.
  - c. Arrange for a specialist service to check chiller sets for correct operation. Check operating temperatures and pressures, operating and safety controls. Top up refrigerant as required.
- ix. Yearly Tasks  
As half-yearly, and in addition :-
- a. Inspect and repack with grease fan and motor bearings.
  - b. Inspect, clean, tighten, adjust and otherwise rectify and faults in the

- c. electrical switchboards and insulation.
- c. Thoroughly inspect, flush out and clean cooling towers, including fans and drivers. Remove any rust and make good corrosion protection as required.
- d. Dismantle pumps, clean out internal and external, grease bearings and repack glands. De-rust and make good anti corrosion coatings.
- e. Dismantle and clean all water strainers.

6. **DEFECTS REPORT.**

It shall be the responsibility of the Contractor to report and advise in writing to the S.O. any defects in the Chiller System and ancillary equipment in order that preventive maintenance be carried out.

The report shall state observed defects and its cause, the parts to be replaced or renewed and shall also include and estimate of the cost of repairs required.

7. **REPAIR AND ANNUAL OIL CHANGE.**

The Contractor shall repair all defects in the Chiller System including all ancillary equipment and annual compressor oil change including oil filters, 'O' Ring etc. on the instructions of the S.O.

The Cost of such repairs shall be separate and shall not be included in the costs for monthly service and maintenance.

All repairs on the complete Chiller System and ancillary equipment shall be guaranteed by the Contractor against defects in workmanship and material for a period of Six (6) months to take effect from the date of completion of the repairs.

8. **RATES FOR SERVICE AND MAINTENANCE.**

The Contractor shall quote the rate for the service and maintenance of the complete Chiller System, AHU, split units and ancillary equipment.

These rates quoted by the Contractor at the time of tender shall hold good for the period of twenty four (24) month commencing from the date of award.

The Contract may be extended for another twelve (12) month when both the Contractor and S. O. agreed to maintain the same rate for the monthly and maintenance work as specified in this tender.

## 9. SCHEDULE OF PRICES.

BIL	JENAMA	JENIS	KEDUDUKAN	KUASA	BIL. UNIT	HARGA SEUNIT	HARGA SENGGARAAN SEBULAN
1	CARRIER	AIR COOLED CHILLER	CHILLER PLANT ROOM	110 TR	3		
2		AIR HANDLING UNIT	MASJID NEGERI	20.0 hp	5		
3		MAIN SWITCHBOARD	MASJID NEGERI				
4	TOPAIRE	CEILING CASSETTE	DWN SYARAHAN	3.5 hp	8		
5	YORK	WALL MOUNTED	KELAS OMAR	2.0 hp	2		
6	YORK	WALL MOUNTED	KELAS ABU BAKAR	2.5 hp	2		
7	YORK	WALL MOUNTED	TADIKA	1.0 hp	1		
8	TOSHIBA	WALL MOUNTED	BILIK AZAN	2.0 hp	3		
9	TOPAIRE	WALL MOUNTED	PEJ. AM	1.5 hp	1		
10	YORK	WALL MOUNTED	PEJ. AM	2.5 hp	1		
11	TOPAIRE	WALL MOUNTED	PEJ. AM	2.5 hp	1		
12	YORK	WALL MOUNTED	PEJ. AM	2.5 hp	1		
13	YORK	WALL MOUNTED	BLK TIMB. IMAM BESAR	2.5 hp	1		
14	ACSON	WALL MOUNTED	RUANG MENUNGGU	1.5 hp	1		
15	YORK	WALL MOUNTED	BLK IMAN BESAR	2.5 hp	1		
16	CARRIER	CEILING MOUNTED	BLK MUSAFIR	2.5 hp	1		
17	CARRIER	WALL MOUNTED	BLK MUSAFIR	2.5 hp	1		
18	CARRIER	WALL MOUNTED	BLK VIP	2.5 hp	2		
19	ACSON	CEILING MOUNTED	DARJAH 4 (NASA E1)	2.5 hp	2		
20	ACSON	CEILING MOUNTED	DARJAH 3 (ABU DAUD)	2.5 hp	2		
21	ACSON	CEILING MOUNTED	DARJAH 2(MUSLIM)	2.5 hp	2		
22	ACSON	CEILING MOUNTED	DARJAH 1	2.5 hp	2		
23	CARRIER	WALL MOUNTED	BLK MESYUARAT	2.5 hp	2		
24	CARRIER	FLOOR STANDING	BLK RTM	2.5 hp	1		
25	YORK	WALL MOUNTED	KELAS ALI	1.0 hp	1		
26	YORK	WALL MOUNTED	KELAS ALI	2.0 hp	1		
27	YORK	WALL MOUNTED	KELAS OTHMAN	1.5 hp	2		
JUMLAH					50		

**10. SUMMARY OF PRICES**

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>PRICES (RM)/ MONTHLY</b>	<b>PRICE (RM) 24 MONTH</b>
<b>1.</b>	To perform monthly servicing and maintenance of Three (3) units 110RT Carrier Chiller, Five (5) AHU, Fourty Two (42) units split units, and all ancillary equipment comprising the complete Chiller System at Masjid Negeri Pulau Pinang.	<b>RM</b>	<b>RM</b>
	<b>Grand Total</b> <i>(Total to be carried forward to Form of Tender)</i>	<b>RM</b>	<b>RM</b>

Tandatangan Pentender .....

Nama & Alamat  
(Cop Syarikat) .....  
.....  
.....  
.....

Tarikh : .....



**Senaraikan Kerja-Kerja Yang Telah Disiapkan & Penyelenggaraan yang pernah dilaksanakan.**

Nama Projek	Jabatan/Agensi / Perunding Yang Mengawas Projek	Harga	Tempoh	Tarikh Siap Sebenar

**Senarai Nama Pekerja**

Bil.	Nama Pekerja	Jawatan	No K/P @ Passport

**Senarai Peralatan & Kenderaan**

Bil.	Jenis Peralatan / Kenderaan	No. Pendaftaran