

SECTION 4.0 TESTING & COMMISSIONING

4.4 KITCHEN EQUIPMENT SERVICES



SECTION 4.0 TESTING & COMMISSIONING (T&C)

4.4 KITCHEN EQUIPMENT SERVICES

1 GENERAL

The work covered by the specification under this section is for the supply of all materials, appliances, labour and necessary incidentals for the comprehensive inspection, service and maintenance of all the Kitchen Equipment Services and ancillary equipment during the **ONE (1)** year guarantee period. This specification shall also be applicable in the event the service and maintenance contract is awarded to the contractor after the expiry of the guarantee period.

All works to be performed under this specification shall be in accordance with good engineering practice and must be in strict accordance with this specification.

2 TESTING AND COMMISSIONING OF KITCHEN EQUIPMENT

The Contractor shall supply all necessary testing, calibrating instruments and labour required for the setting and commissioning of the Kitchen Equipment installed by him. The Contractor shall also allow for any necessary replacement of parts in order to achieve the conditions specified in drawings and specifications.

The S.O. shall be informed when such testing will be carried out. During the testing period, the Contractor shall have his supervising foreman and mechanics available to aid in testing and to perform any adjustment as directed.

The testing and commissioning work shall be carried out under the direction of either a competent registered professional engineer or qualified and experienced personnel.

All readings taken during the testing shall be tabulated in the appropriate forms. These forms shall cover every aspect of the Kitchen Equipment Item submitted to the S.O. for approval.

The test instrumentation and tools will be required to undertake the tests detailed within this procedure.

On completion of the testing, the contractor shall issue a test report.

All cost incurred shall be included in the contract amount, this will also include the cost for repaint of all damaged on wall finish and on ceiling finish, redo any damage to wall, ceiling and other equipment that might be damaged due to the work.



3 TESTING AND COMMISSIONING OF KITCHEN HOOD EXHAUST FAN & COLD ROOM SYSTEM

3.1 BALANCING, TESTING & COMMISSIONING

1 General

- (a) The CONTRACTOR shall supply all necessary balancing, testing, calibrating instruments and labour required for the setting and commissioning of the Kitchen Hood Exhaust Fan & Cold Room System installed. The contractor shall also allow for any necessary replacement of parts in order to achieve the conditions specified in drawings and specifications.
- (b) The S.O. shall be informed when such testings will be carried out. During the testing period, the contractor shall have his supervising foreman and mechanics available to aid in testing and to perform any adjustment as directed.
- (c) All readings taken during the testing shall be tabulated in the appropriate forms. These forms shall cover every aspect of the refrigerant Systems and must be submitted to the S.O. for approval.

2 General Commissioning Requirements

Systems shall be properly adjusted and commissioned to ensure that equipment achieve the design airflow rates.

The following general requirements shall be met before actual testing and commissioning are carried out

- (a) All dust generating activities by other trades are completed and all area thoroughly cleaned to prevent ingress of building dust and debris into the return air or fresh air intake systems.
- (b) Air intake screens and louvers are unobstructed and clean.
- (c) Fan and other equipment chambers are clean and free of construction debris.
- (d) Fan are check for proper operation.
- (e) All condensate drain and trays are clear and water can be drained away satisfactory.
- (f) All safety devices including circuit interlocks and cut-out shall be correctly inserted into the overall operation plan and will effectively carry out the purposed intended.
- (g) Measuring instrument has been calibrated against certified standards.
- (h) As far as practical, the contractor shall be demonstrate by simulation of fault condition.



3 Kitchen Hood Exhaust Fan & Cold Room T&C

The contractor shall perform all necessary works to install the system as specified herein, and commissioned the system into proper operation.

Regular maintenance service will be provided during the twenty four months' warranty period. In addition all parts and labour shall be provided free of charge to rectify all defects in manufacture of workmanship during this period.

4 Operation Checks

To check

- (a) That all full rated flow of the control media, the fan pressures are within design tolerances immediately prior to setting up.
- (b) That the input temperature of the control media and the within specified design limit comply to design limits.

5 Leak Testing and Evacuation

The system shall be pressurized at 300 psi with nitrogen for at least 24 hours for leak detection with all the valves in the refrigeration lines fully open.

After the system has been fully tested to be leak free, it shall be evacuated to a vacuum pressure of not more than 5mm Hg.

6 Piping Systems

- (a) During the pressure test, all welding joints, bends, fittings and valves shall be checked for any leaks or deformations for the entire piping system. Expanded conditions of all piping's shall be carefully studied and any necessary changes in hangers, anchors or guide locations shall be made.
- (b) All equipment not capable of withstanding the test pressure shall be disconnected when testing the piping with 300 psig. But shall be reconnected and tested with actual working pressure and temperature.
- (c) The flow rates through all of the piping system components shall be verified and adjusted until the proper temperature differentials are obtained at full load operation.

7 Electrical

The following checks are to be made before switching on the electricity supply:

- (a) That all the wiring has been installed to the required standards and regulations and is in accordance with manufacture's requirement.

Special care should be taken to ensure that the cable possesses suitable physical and electrical characteristics that earthing suits the regulation of the equipment.

- (b) That all connectors are in accordance with relevant wiring diagrams supplied.



- (c) The electrical supply at the point of distribution for the control system is correct and suitably rated fuse is available.
- (d) That all thermal overloads on starters has been checked and adjusted for the actual load and the settings been recorded.
- (e) That all circuit breaker overload settings had been checked and recorded.
- (f) Each motor shall have its voltage and current draw recorded.

4 TESTING AND COMMISSIONING OF WET CHEMICAL SYSTEM

4.1 BALANCING, TESTING & COMMISSIONING

1 General

The supply of all instruments, equipment and labour for conducting inspection, tests and demonstration shall be provided in this contract and the cost thereof shall be deemed included in the tender amount.

2 Inspection

- i. The completed installation shall be instructed by factory authorized and trained personnel. The inspection shall include a full operational test of all components as per equipment manufacturer's recommendations.
- ii. Inspection shall be performed in the presence of the JKR mechanical engineer or his representative.
- iii. All mechanical and electrical components shall be tested according to the manufacturer's recommended procedure to verify system integrity.
- iv. Inspections shall include a complete checkout of the detection / control system and certification of cylinder pressure. A written report shall be filed with the JKR.
- v. The quantity of agent shall reflect the actual design quantity of Wet Chemical agent.
- vi. The system shall be tested according to the designed mode of operation in the presence of JKR mechanical engineer or his representative.

3 Test Of Detection System

The contractor shall carry out stimulation test as instructed and with the presence of JKR mechanical engineer or his representative. The contractor shall price in his tender for all consumables such as fusible links etc. used in the test.

5 TESTING AND COMMISSIONING OF LPG SYSTEM



5.1 TESTING & COMMISSIONING

- i. The contractor to carry-out testing procedure according to Suruhanjaya Tenaga / JKKP requirement.
- ii. The contractor shall notify the Jabatan Kerja Raya when these tests are to be conducted so that a Jabatan Kerja Raya representative may be present.
- iii. Prior to testing, pipes are to be visually inspected during or after manufacture and fabrication. The piping installation shall be carefully tested to ensure that it is leakage free. Piping systems may be tested as a complete unit or as the construction progresses. Where any part of the installation is to be enclosed or buried, the test should be carried out prior to concealing them.

A valve is not to be subjected to a test pressure unless it is determined that it can safely withstand the test pressure

- iv. Test medium shall be air or inert gas. **Oxygen or LP Gas shall never be used.** Where possible pipe joints including welds shall be left uninsulated and exposed for examination during the test unless they are previously tested. Prior to testing the interior of the pipe shall be cleared of all foreign material. Pressure shall be measured with a manometer or equivalent device calibrated to read in increments of not greater than 0.5 kPa (0.1 psi). The source of pressure shall be isolated before tests are made.
- v. **All parts of the installation subjected to test pressure of 1.5 times the pressure corresponding to the maximum assessed pressure of the product being carried. During pressure testing, the testing section must be periodically checked with the interval of 10 minutes to observe the pressure and presence of fault. The pressure retention time is 2 hours continuously according to MS 930.**
- vi. In any part of the installation as protected by safety relief devices or valves then the test pressure shall be that at which these relief devices or valves operate. Naked flames must never be used for checking the gas tightness of installations. Defective pipes or fittings shall be replaced and not repaired.
- vii. The contractor shall submit to the S.O. a copy of Approval To Operate (ATO) from Suruhanjaya Tenaga / JKKP.

6 RELIABILITY TEST AND TEST RECORDS

- i. When the preparatory tests have been completed successfully and the contractor has notified the S.O. that the installation will be required to operate either continuously or intermittently as maybe required without failure of any kind before the "Handing Over Certificate" will be issued.
- ii. Should any failure occur due to, or arising from, faulty fittings, materials or workmanship but otherwise sufficient to prevent the commercial use of the installation, a reliability test period of one calendar month shall be recommended after the Air-Conditioning Contractor has remedied the cause of failure to the



satisfaction of the S.O.

- iii. On completion of the testing and commissioning of the installation, the contractor shall submit two (2) copies of all test records to the S.O. for verification.

7 TESTING EQUIPMENT AND ACCESSORIES

The Contractor shall supply all necessary testing equipment in order to calibrate and test the system and shall generally include the following:

- a. Clamp on Amp meter (digital)
- b. Multimeter
- c. Mega Ohmmeter
- d. Touch Light
- e. All necessary spanner and screw driver
- f. Dry Bulb Thermometer (0.25°C accuracy)
- g. Sling Psychrometer
- h. Velometer with hot wire sensing element
- i. Air velocity meter
- j. Manometer for static pressure
- k. Tachometer
- l. Etc.

All testing equipment shall be supplied and delivered to the office of Pengarah Cawangan Kejuruteraan Mekanikal within a month after tender awarded.

8 SCOPE OF WORK FOR MAINTENANCE

The contractor shall provide all materials, appliance, labour and necessary incidentals to carry out the following:

- (a) The contractor shall inspect service and maintain the aforesaid system and equipment in accordance with the Inspection, Servicing and Maintenance Schedule as set in Section 5 clause 10. The routine service as listed in this Schedule shall be the minimum that shall be provided by the contractor and may be upgraded based on the recommendations by the equipment manufacturer or equipment usage requirement anytime during the maintenance duration.
- (b) The contractor shall advice the S.O. of defects on any part/s of the system observed during routine inspection and service and shall repair such defects.
- (c) The contractor shall provide emergency repair service during normal working hours and also during overtime hours if required to do so by the S.O.
- (d) The contractor shall also periodically instruct the operators responsible for the operation of the aforesaid system and equipment on correct and safe method of operating the plant and equipment.
- (e) The contractor shall also carry out repairs arising out of his neglect during periodical maintenance or arising due to his failure to carry out the periodical maintenance. Such repairs inclusive of supply of parts shall be carried out by the contractor at no additional charge to the government.



- (f) All repairs on the aforesaid system and equipment shall also be guaranteed by the contractor against defects in workmanship and materials for a period of one year to take effect from date of completion of repairs.

9 WORKMANSHIP AND MATERIAL

The work described in this specification shall be performed by workmen skilled in the inspection, service, maintenance and repair of the aforesaid system and equipment.

All materials to be supplied in connection with the work under this specification shall be new, unused and shall generally be of the best quality as regard manufacture and performance.

10 SUPERVISION

The contractor shall have a foreman in charge of the inspection, service, maintenance and repair work to be carried out under this specification. This foreman must be thoroughly competent in supervising the inspection, service, maintenance and repair of aforesaid system and equipment and shall be in the direct employ of the contractor, and acceptable to the S.O.

The contractor shall have in his direct employ, workmen who are especially skilled in the inspection, service, maintenance and repair of the aforesaid system and equipment.

11 CONSUMABLE MATERIALS

The contractor shall supply the following consumable materials as and when required:-

- (a) All oils and greases required for lubrication of pumps, bearings, motor bearings, pivots and other moving parts.
- (b) All lubrication oil and filter required for periodical diesel engine oil change.
- (c) All consumable filter elements.
- (d) All carbon brushes required to replace worn brushes in electric motors.
- (e) All electric contact points /contactors / relays /timers required to replace worn electric contact points in switch gears, motor starter gears, electric control gears and electric relays.
- (f) All cotton waste, soap detergent and other cleaning materials required for cleaning purposes.

The cost of these consumable materials shall not be charged for separately, but shall be included in the cost quoted by the contractor for the service and maintenance of the aforesaid system and equipment at the time of submitting his tender.

12 OPERATION INSTRUCTION MANUAL

At least Five (5) sets of operation instruction manual for the complete system shall be furnished and supplied by the contractor.



13 PERFORMANCE WITNESS TEST

The Condensing Unit and the evaporator system shall be witness tested at the manufacturer's premises by two (2) JKR representatives to be nominated by the Pengarah Cawangan Mekanikal, Ibu Pejabat JKR, Kuala Lumpur, before being delivered to site.