DEPARTMENT OF BUILDING SURVEYING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
PERAK

WORKS AND MAINTENANCE SERVICE ON AIR CONDITIONING SYSTEM AT UITM SERI ISKANDAR CAMPUS PERAK

SAIDATUL FARHANA BINTI HARUN
2010643374
DIPLOMA IN BUILDING SURVEYING

PRACTICAL TRAINING REPORT
JUNE 2013 – SEPTEMBER 2013

CONTENTS

Abstract

Bismillahirahmanirahim…

A lot grateful to Allah S.W.T because I have completed my assignment successfully within the time is given.

First and foremost, I would like to thank my supervising lecturer, Puan Nadira Ahzahar for the tireless work in explaining and helping me until I finish mine assignment completely.

Secondly, thanks to all the group of Deparment Development and Fasilities Management members especially Encik Mohd Kamrol Rashid and Encik Mohammad Masli Hisham for commitment cooperation and guidance when I have been practical training at there.

Thirdly, thanks to my family that helping and give me some financial support and an advice to keep on and be struggle. Lastly, I would like to thanks my friends and other peoples that willing to help me and give me some information that is needed and useful for this assignment.

Thank you.

CHAPTER 1

1.1 DEPARTMENT BACKGROUND

The early history of the establishment of the Bahagian Pembangunan dan Pengurusan Fasiliti UiTM was established in UiTM Manjung, Perak Darul Ridzuan and formerly codenamed know as Unit Pembangunan dan Penyelenggaraan (UPP) in the yearly 1985 as a major facility that play main role to maintain the five shophouses that is perform as the classroom in conjunction with the establishment of the Universiti Teknologi MARA (Perak) for the year in Bandar Baru Seri Manjung. Meanwhile, the numeral staff on duty for that time, three employees only.

In 2002 the UPP was later transferred to the Bandar Seri Iskandar and the UPP is given a new name again know as Unit Selenggara Bangunan dan Kawasan (USBK) before the introducing the new name as used until now. UPP is then transferered and the transferes of this department are appropriate for the establishment of UiTM Perak campus that is fully operational on January 1, 1999 as the second largest campus of UiTM in Malaysia.

In 2005, the exchanges of name occur again to the Bahagian Pembangunan dan Penyelengggaraan (BPP) that is consisting of 35 members of staff. This division is divided into two units such as Civil Works Unit and Mechanical and Electrical Unit that are fully responsible for the campus area for about 392.36 acres.

In 2006, the new name to Bahagian Pembangunan dan Pengurusan Fasiliti (BPPF) instantenuosly with the exchange name to every campus branch enforcement start on April 2006 (Ref : Pekeliling Pejabat Pengurusan Fasiliti Bil.3 Tahun 2006) . Total staff as part of the maintenance of civil works in 2010 rose to 47 people before increase again to 57 people.

This department is responsible for managing any works related to the development and maintenance management of UiTM Perak. In addition, this department also provides maintenance management in Electrical & Mechanical (M&E) and the Civil Projects because it is a very important service to maintain the building. Electrical service operated by Unit Elektrik including repairing works of electrical and telephone while, air-conditioning systems is fully maintained by the Unit Mekanikal. The Civil Works Unit is fully responsible for the maintenance and repair of the building which includes pest control, cleaning and plumbing system in UiTM Perak. In other words, the Bahagian Pembangunan dan Pengurusan Fasiliti is one of the most important units in managing the works and any defect occurs towards to maintain the development of UiTM Perak.

The units at Bahagian Pembangunan dan Pengurusan Fasiliti of Universiti Teknologi MARA (Perak) is restructuring and renaming again in October 2011 in accordance to enhance UiTM Perak towards achievement vision towards becoming a world global class public institutions and technologically . Among them is Pejabat Pentadbiran Am, Bahagian Pembangunan dan Projek, the upgraded function of Bahagian Pembangunan dan Pengurusan Fasiliti and Unit Kontrak is monitoring and is headed by the one engineer and is assisted by a Penolong Jurutera.

Beginning in October 2012, the facilities management is manage by the sequence of zone system facilities management and is lead by the Assistant Engineers appointed as Zone Leader to give an advice.

1.2 INTRODUCTION OF DEPARTMENT

1985
Unit Pembangunan dan Penyelenggaraan (UPP) was established in UiTM Manjung Perak Darul Ridzuan, with the number of staff is only 3 people.

2002
UPP moved to a new campus, Bandar Seri Iskandar and is given a new name, Unit Selenggara Bangunan dan Kawasan (USBK).

2005
Name change to the Bahagian Pembangunan dan Penyelenggaraan (BPP) and is consisting only 35 members of staff.

2006
New name change to the Bahagian Pengurusan Fasiliti (BPF).

2011
New name change to the Bahagian Pembangunan dan Pengurusan Fasiliti (BPPF).

2012

The introduction of campus new style management by Bahagian Pembangunan dan Pengurusan Fasiliti to every campus branch in Malaysia through system such as management by zone accordance to the high risk to the low risk management headed by the Assistant Engineers appointed as Head of Zone in the respective zones.

Zone	Bangunan Fasiliti
1	The Administration of Building, Dewan Seri Iskandar (DSI), Dewan Serbaguna (DSG), Pusat Islam, BPPF and the Library.
2	The Bangunan Akademik and the Fakulti- fakulti Pengajian Mahasiswa
3	The Kolej Penempatan Pelajar and Food Court Hall.
4	The Pusat Mahasiswa Utama, Uptown, Pusat Sukan, Unit Kesihatan, Pos Utama, and the Kampus Metro.

Figure 1.2 The Tentative Through Years Of Department Development And Management Facilities

1.3 VISSION, MISSION AND OBJECTIVE

VISION

Make the Bahagian Pembangunan dan Pengurusan Fasiliti (BPPF) as part of efforts to support UiTM (Perak) to achieve the vision of leading University.

MISION

Provide complete infrastructure and facilities through development projects and campus facilities management that is fleksibel and quality.

OBJEKTIF

To ensure that the operations, project management, customer service, business and occupational safety and health maintenance geared towards the direction of an efficient and effective asset to ensure the education and teaching to function properly.

Figure 1.3 The Vission, Mission And Objektif Of The Department

1.4 ORGANIZATION CHART OF DEPARTMENT

1.5 MAIN ROLE OF BPPF

BAHAGIAN PENGURUSAN DAN PEMBANGUNAN FASILITI

i. Ensure the level of downtime per PABX does not exceed 600 minutes for a period of one year.
ii. Ensure the level of downtime per cell does not exceed 30 minutes for a period of one year.
iii. Execute the scheduled maintenance work.
iv. Providing maintenance services and air conditioning system refrigerant defrost.
v. Providing maintenance services alarm systems and fire extinguishers.
vi. Provide system maintenance services elevator, dining hall kitchen equipment, punch and Building Automation System.
vii. Manage and supervise the work of heavy and light vehicle maintenance and official vehicles UiTM.
viii. Manage water supply systems.
ix. Manage and monitoring the cleanliness of the building and the area
x. Building maintenance such as repairs and upgrades under RM200 000.
xi. Maintenance of infrastructure such as roads and all kelengkapanya, drains, monsoon, gate, parking, sewerage systems, slope stability, etc.
xii. Manage environmental facilities services such as pest-borne disease control, sanitation and refuse collection equipment.
xiii. Manage all official functions Bahagian / Faculty at UiTM
xiv. Implement building maintenance work scheduled.
xv. Plan and perform the upgrade work college buildings.
xvi. Refurbishment and upgrading of sports facilities.
xvii. Maintenance and repair structural damage to buildings.
xviii. Plan and manage facilities and management systems.

1.6 THE DEFINITION OF OUTSOURCES COMPANY

There are many definitions of outsourcing as there are ways to screw it up. But at its most basic, outsourcing is simply the farming out of services to a third party.

Other than, that outsources is the process of delegating a company's business process to third parties or external agencies, leveraging benefits ranging from low cost labor, improved quality to product and service innovation. It is also used to describe the practice of handing over control of public services to for-profit corporations.

Meanwhile, the outsource is a practice used by Ministry of Higher Education such as UiTM Seri Iskandar (Perak) to reduce cost by transferring portions of work to outside suppliers rather that completing it internally. It is an effective cost-saving strategy when used properly and sometimes more affordable to purchase a good services from another companies with comparative advantages than it is to produce the good internally. The main benefits for UiTM as the leading innovation in Higher Education System are to give the ability to focus on core competencies management for it.

Outsources company is where a company or corporation is intend to hire another company such as UiTM Seri Iskandar (Refer Appendixes for more incuiry detail of outsources company) that is directly hires independently contractor through a contract to perform certain projects such as Ciil Works Projects, Mechanical and Electricals Projects and so on.

1.6.1 THE OUTSOURCES COMPANY IN UITM SERI ISKANDAR, PERAK.

COMPANY PROFILE

Name of Company	:	BASIC NETWORK ENGINEERING
Register number of Company	:	IP0152205 V
Register number of PKK	:	0803 G 2002 0066
Register number of CID	:	0120020819-PK073961
Register number of K.KEW	:	357-01017339
Main Address		NO.21 &21A, HALA SEPAKAT 3, TAMAN DESA RAPAT 31350 IPOH PERAK DARUL RIDZUAN.
Branch Adres	:	NO. 44 LINTANG SULTAN MOHAMED 1A, PUSAT PERDAGANGAN BANDAR SULTAN SULAIMAN, 42000 PELABUHAN KLANG, SELANGOR
Email Adress	:	www.basicnetworkgroup.com
Tarikh Ditubuhkan	:	22/01/2000
Office Number	:	05-3136488
Fax Number	:	05-3122488
Typed of Company	:	PEMILIKAN TUNGGAL
Syarikat Activities	:	PEMBINAAN, CIVIL ENGINEERING WORKS, M&E, TELECOMMUNICATION.

1.6.2 COMPANY OWNER

COMPANY OWNER

Name	:	ABD. AZIZ BIN AHAMED KUTTY
I/C Number	:	680102-01-5417
Adress	:	NO 1 JALAN RAPAT PERMAI 1 TAMAN RAPAT PERMAI 31350 IPOH PERAK
Education	:	SIJIL PELAJARAN MALAYSIA
Natinality	:	WARGANEGARA MALAYSIA (BUMIPUTERA)
Gred		PENGARAH URUSAN
Race	:	MELAYU
Knowledgement	:	1993 MULA MENCEBURI BIDANG KERJA-KERJA PEMBINAAN 1995 MENJADI PENGURUS PROJEK 2000-2004 SYARIKAT SENDIRI MULA DITUBUHKAN IAITU BASIC NETWORK ENGINEERING (BNE) DAN DALAM MASA YANG SAMA MELIBATKAN DIRI DENGAN SYARIKAT PEMBINAAN YANG LAIN SAMAADA KERJA-KERJA PEMBINAAN, CIVIL WORKS M&E DAN KERJA-KERJA TELEKOMUNIKASI.

1.6.3 DETAIL IN BANKING

DETAIL IN BANKING

BANK		CIMB BANK BERHAD. 112, JALAN SULTAN IDRIS SHAH, 30740 IPOH PERAK DARUL RIDZUAN PHONE NUM:05-2542316
ACCOUNT NUMBER		0803-0013201-05-3
ACCOUNT TYPE		CURRENT ACCOUNT

1.7 INVOLVEMENT DURING PRACTICAL TRAINING

During undergo practical training after is placed by the Koordinator Practical at Bahagian Pembangunan dan Pengurusan Fasiliti at Zone 3 priority in manage the daily reports that is raised by the occupant such as student and college supervisor and my major involvement during practical training is on Mechanical and Electrical works. For the next third day, I was invited by an Mechanic Cooling, Encik Mohamad Azha Shah to visit an office at CITU, Pusat Islam to monitoring the new installations of an air conditioning type split unit that is handled by an outsources company, the CMA Services and Installations Sdn. Bhd with their moto "Quality and Safety First".

At there, I was taught about the procedure installations of an air cond type split unit. The installation of split unit is easy because it's involving a small unit between indoor unit and outdoor unit compared the other conditioning system type package system or centralized system. The indoor unit is consist the main component such as evaporator whereas the liquid coolant will absorb the heat at the indoor room and the gas is expand before bring back to the outdoor unit to compress the gas before reverting back to low the temperature and pressure before flowing back to evaporator.

For the next practical training, I was managing to monitor the works and a service of a split unit air conditioning at Pejabat Kolej Pasir Salak that is handled by the same outsources company the CMA Services and Installations Sdn Bhd. They have to perform faster to finish they jobs because it includes several building that contained several an air conditioning. They jobs is to service all an air filters of air conditioning at the zone 3 only, while the others zone is manage by another outsources company such as Basic Network Sdn Bhd and Enggang Ria Sdn Bhd the new company serve for UiTM Perak.

The services of air filters for one unit air conditioning is so easy but for overall air conditioning at certain building is not easy and the jobs cannot be done with hasty because it will give bad performance to builders compared the cleaning of AHU unit that consist 5 unit AHU only. But the cleaning air filter of AHU unit also very difficult based on air filter size that is more bigger than the air filters of split unit and it takes an hour to finish and totally clean. While, the cooling coil of the indoor unit is clean with the chemical liquid if necessary to stain and remove the dirt, pollen and dust that stuck the cooling coil. The presence of dust, stuck the absorbed of air and this will cause suffering extreme heat occur in cooling coil. Reason, the suction of gas to compressor is not complete because the temperature and pressure that go to the compressor is still high with the cooling coil turns the compressor become hot. The flexible services on air conditioning prevent the damages occur.

The last involvement I had journey is the installations new compressor of chiller unit at the Chiller Plant Room. The installation compressor is manage by the another outsources

company, the Basic Networking Sdn Bhd. As I know, the replacement of the compressor is really important because the cooling operation cannot operate functionally if the compressor is breakdown. The compressor is the pulse of an air conditioner operation because the function is to compress the refrigerant gas whereas it will compress the gas to high temperature and pressure and passing it to the condenser.

CHAPTER 2

2.1 HISTORY OF AIR CONDITIONING

The history of the development of space cooling is exist since thousands of years whereas the Romans had found the original idea to drain the aqueduct water through the walls of home to lower the temperature in the house.

Aqueduct is a man-made water channel that serves to drain water from one location to another. The Romans made channels in the wall to drain the water from the aqueduct to cool at room temperature. When the wall of the building is cools, the temperature and condition would be cool too.

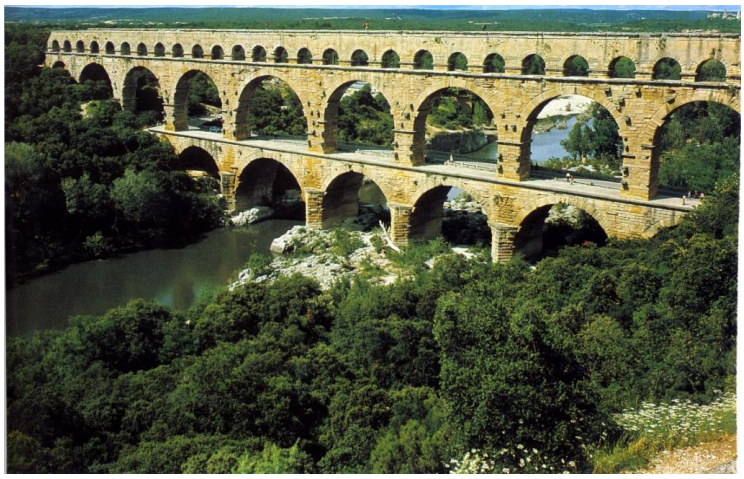


Diagram 2.1.1 The Aqueduct At Pont Du Gard, France, Built By The Romans In The 19th Century BC.

Diagram 2.1.2 The Artificial Built Roman Aqueducts That Drain Water From The Pool Solomon Headed To Jerusalem Or Jerusalem, Which Requires An Enormous Amount Of Water And Only Affordable Own By Rich People Only.

In 1820, scientist and inventor from British name of Michael Faraday discover new ways to cool the air by using ammonia gas. The liquid ammonia was heated and the resulting steam occurs and affords to cool down. Then, in 1842, a doctor named John Gorrie figured out a way to cool the air in a Florida hospital ward. He has made use analysis machine to cool the room temperature using compression technology.

That ice machine not only can be used in one room but the whole building can be cooled. However, the idea can not be developed because he had died in 1855 after his invention patented. Technology is growing in line with the needs and problems existing. In this context Dr. John Gorrie tried to give a comfortable to his patients to feel more cool and early recovery.

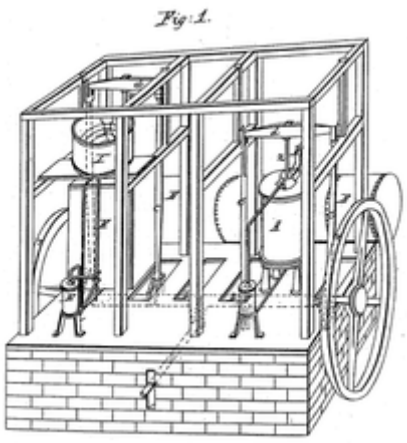


Diagram 2.1.3 The Ice Machine Design By Dr.Jphn Gorrie

The innovation of idea is created again starting in the year around 1850, wheares the printing factories often have problems with printing results such as inconsistent ink and color fading effects of the printing paper that is found to expanding temperature is high. A printing company in Buffalo, U.S. States has asked for assistance Willis Haviland Carrier, an engineer from New York to overcome his printing factory problems. The company asks Carrier created a tool that can manipulate the air temperature. Finally, on July 17, 1902, Carrier complete the first design an air conditioner to be a machine needs by an industri.It is weighing for about 30 tons and on initiai amplitude 25 April 1939, in an artificial igloos, Carrier air conditioning demonstrated ability in controlling the room temperature.

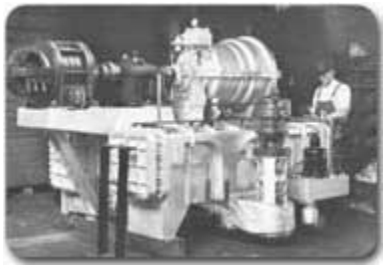


Diagram 2.1.4 The Chiller Design By W. Haviland Carrier.

Carrier then develop an enterprises that produce air conditioning the product of to cool down temperature for home todays. First installed air cond unit is on 1927 in Mineapolis, Minnesota. Although it evolved into various forms and uses, the principles and ways of working air conditioner remains the same. Technology will continue to evolve, but the basic principles remain the same.

2.2 DEFINITION OF MAINTENANCE MANAGEMENT

The Definition of Maintenance Management as set out in BS 3811 is as follows:

" The works undertaken in order to keep, restore and improve every facilitiy (i.e the site, bulding and its content) to a current acceptable standard and to sustain utility and value of facilities ".

This work is to understand the importance of a high quality product or service to the residents and owner. It is so important for driving a continuous process to improve the quality of air to the tenants and the owner himself.

Every owner is priority towards the very important maintenance work, in maintaining the function of the building as it were at the ready and aimed at improving the comfortable life towards the occupant.

Maintenance performed to maintain the physical condition of the property so it can function more effectively with the appropriate life expectancy as an example of mechanical equipment such as air conditioners and fans.

Cleaning on the air-conditioner such as air filters, replace the lack of any chemical, gas R22 additions, repairs such as sweat problems piping, ducting and maintenance on the chiller and compressor, water filters, bearings and pumps, AHU, FCU, VRV and VRF is important in focused on keeping the components performance at high ability.

The management and maintenance works always requires proper work methods, detailed in perfect and brings the components to play the function infinity

2.3 THE INTRODUCTION OF AIR-CONDITIONING

Cooling is the process of heat transfer from a place that is not required to place the needs of heat is needed in an area; space or materials must be moved to make a place, space or materials to be cool or comfortable. This is called as the process "cordinarily refrigerated." Law cooling statated that where heat is transferred from a cold place.

Air conditioning refers to the equipment, systems and mechanisms that are designed to stabilize the air temperature (air temperature) and the environment (humidity) in an area. It usually uses the principle of cooling cycle refrigerant cycle.

Commonly known that heat is a form of energy can not be destroyed but it can be moved from one place to another place, heat is transferred from the high temperature low temperature. Heat can be transferred through 3 modes such as conduction, convection and radiation.

Conduction is the flow heat transfer process is occurring in the material or solid. Heat is transferred from the hot head cold happiness by vibration of particles in solid objects is good conductors. While, convection is the transfer of heat through a fluid such as liquid and gas. Molecular heated liquid or gas will expand and lighter than cold molecules. Lighter molecules will move up and move down cold molecules. Radiation is heat transfer process directly without going through an intermediate medium of high temperature materials to low temperature materials through the empty air space. For example, sunlight heats the ground. Materials that are exposed to the sun will be hot.

2.3.1 THE RELATIONSHIP BETWEEN HEAT AND AIR CONDITIONING

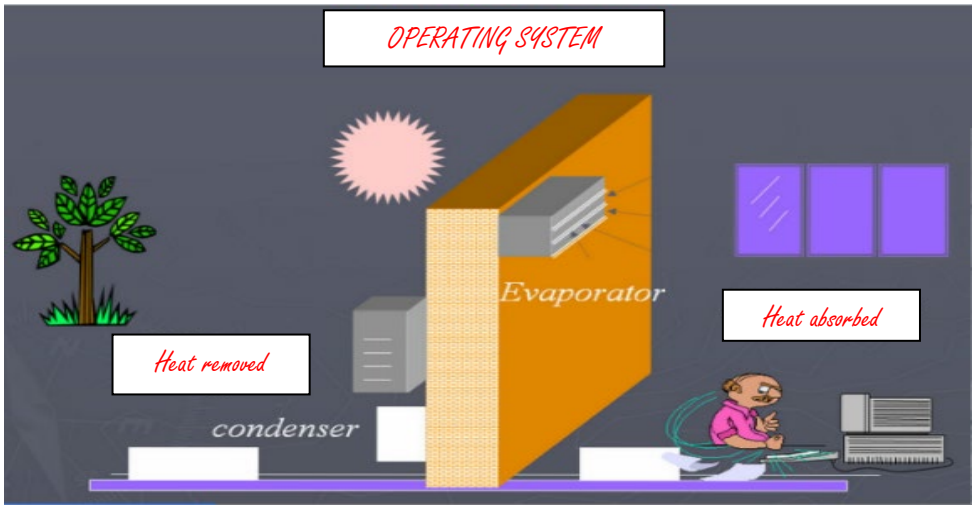


Diagram 2.3.1.1 The Indoor Air Is Absorbed And Then Is Removed Through Outdoor.

2.3.2 BASIC COOLING COMPONENT

Basic components are essential for cooling and air conditioning systems to move a system. Without basic components, the system can not be moved because of incomplete cooling process.

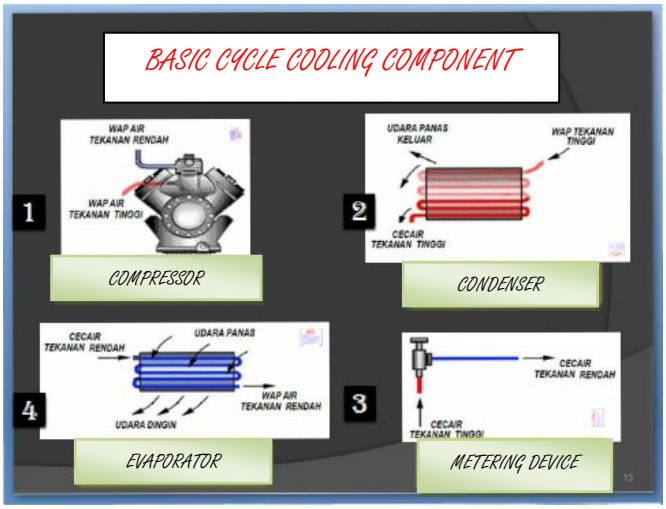


Diagram 2.3.2.1 The Basic Cooling Component In Air Conditioning System.

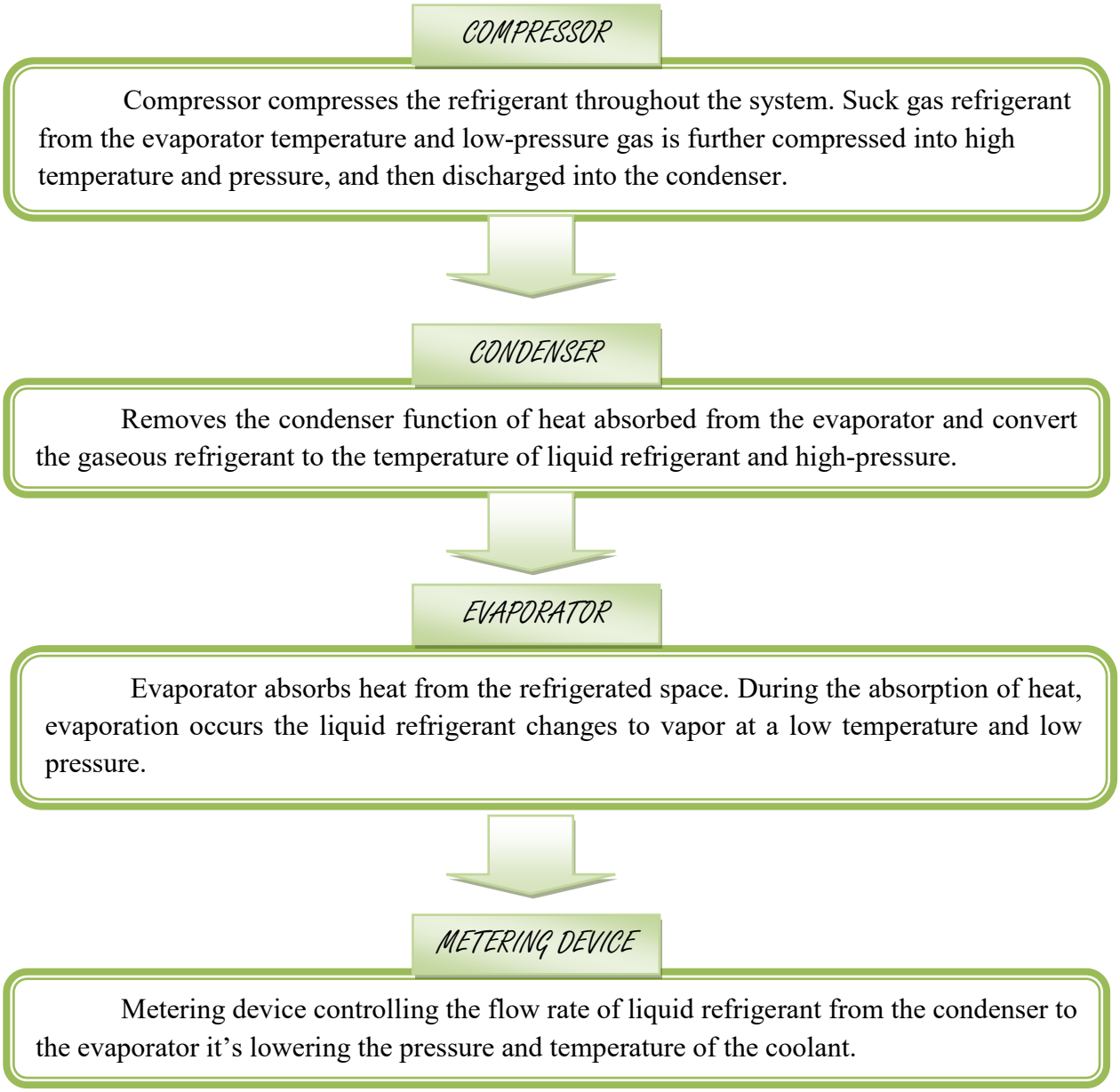


Figure 2.3.2 The Basic Cooling Component Function

2.3.3 BASIC COOLING CYCLE

1. THE CONCEPT

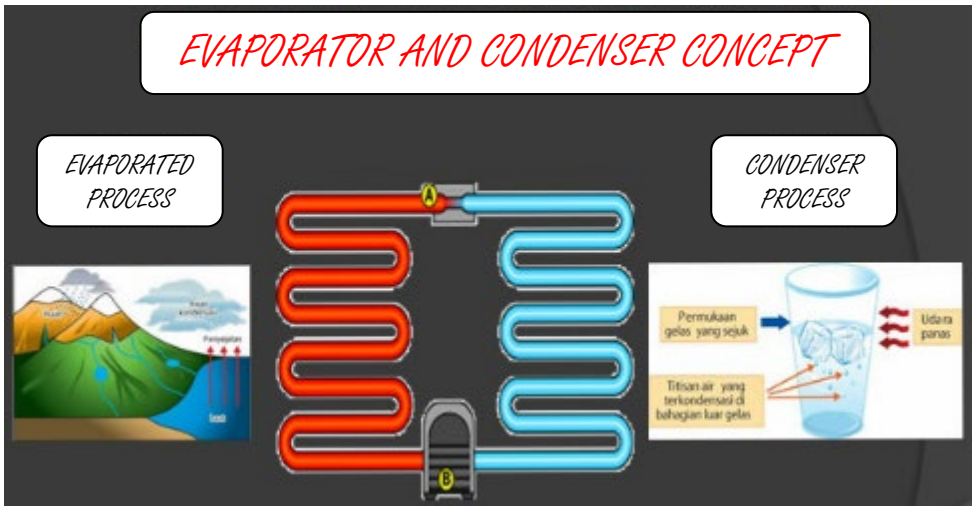


Diagram 2.3.3.1 The Basic Evaporator And Condenser Concept

2. THE DIAGRAM SHOW BASIC COOLING CYCLE

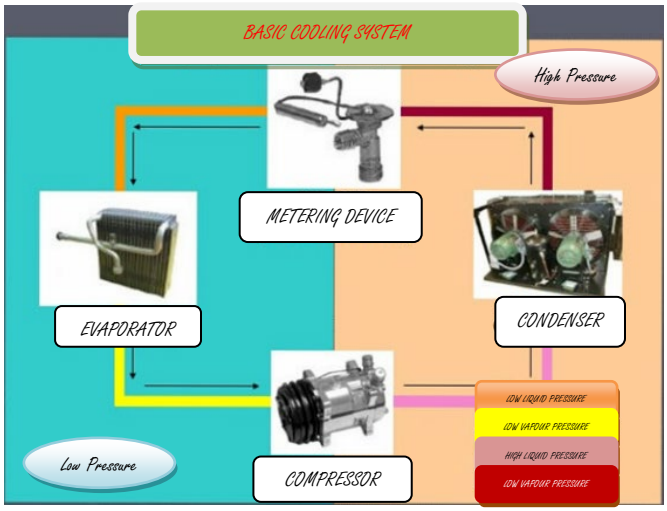


Diagram 2.3.3.2 The Basic Cooling Cycle That Give Different Pressure Occurs In Different Basic Components.

2.3.4 THE TYPES OF AIR CONDITIONING SYSTEM

1. Window Unit

The unit is mounted on a wall or a window in the room to be cooled. Divided into two parts, condensation (located outdoor), evaporator (located indoor)

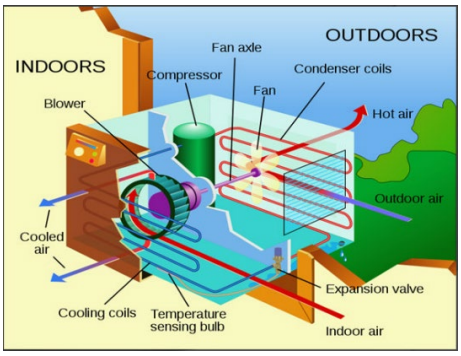


Diagram 2.3.4.1.1 The Window Unit System.

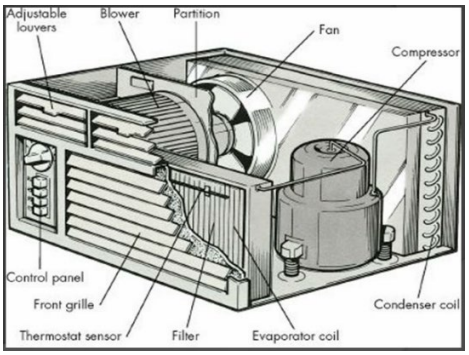


Diagram 2.3.4.1.2 The Deatailed Window Unit System.

2. Split units types

A split air conditioning simply means that's the condenser or sometimes referred to as the outdoor unit is separated from the indoor unit and sit outside of the room. Divided into two units, unit (indoor unit), outdoor unit (outdoor unit). They are joined by two insulated copper pipes which circulate a refrigerant. In cooling mode, warm air from the room is drawn into the indoor unit where heat is absorbed and removed. The air is recirculated back into the room providing cool, comfortable living even on the hottest summer day.There are three types of design units for split type air-conditioning units which type of wall, type of flooring and ceiling types.

THE OTHERS COMPONENT IN SPLIT UNITS

Main Componenet	Others Componenet
Evaporator	Builder in starter
Condenser	Pc/ ic board
Compressor	Blower
Metering device	Motor Fan
	Grill/ Diffuser
	Capasitor
	Receiver
	Valve
	Fan

Figure 2.3.4 The Components Of Split Unit

3. Multi split units types

The multi-split system uses one external unit which is connected to several indoor units. The multi-split system takes a number of different forms and it is essential the designer / specifier understands the limitations of each type of system. In others words, it use one single compressor and two or more units in. Piping system is nearly identical units with units split except external unit connected to two or three units.

Multi split unit are suitable for single areas, single rooms or even multiple rooms with very similar heat gains / loss but are not suitable for individual areas / rooms which have different heat gain.

Again one off condensing unit/heat pump is connected to several indoor units. VRV systems are able to provide total versatility and each indoor unit may cool / heat independently of each other. In fact, if part of a building requires cooling and other areas require heating the heat rejected for the required cooling contributes or is recovered to provide heating in the other area.

4. Fan coil unit types

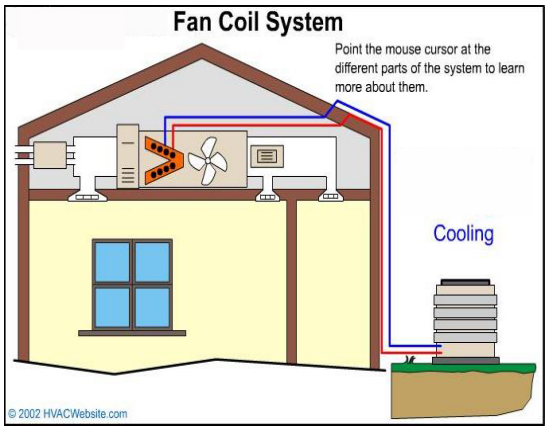


Diagram 2.3.4.4.1 The Flow Of Cooling System For Fan Coil System.

REGISTERS

In building both provides air supply registers and air return registers. Registers are the points of entry for the conditioned air from heating and cooling systems.

Air Cleaner

There are two main types of air cleaners such as mechanical and electronic. Mechanical air cleaners are either a cartridge or a collapse type, both have a dust spot efficiency rating between 20%-30%. Electronics air cleaners have a dust spot effiency rating of 65% and uses about 40-watts of electricity. When combined with a variable-speed motor, both will consume the same amount of electricity as operating a 100 watt light bulb. It is important to maintain air cleaner, becauses it provide building with good indoor air quality and allows entire cooling system to operate efficiency.

EVAPORATOR COIL
The evaporator coil lowers air temperature and removes humidity from the air as it passes over coil

BLOWER WHEEL AND MOTOR
The blower wheel and motor moves the air through central cooling system. There are two types of motors that can be installed within the furnace such as PSC (Permanent Split Capasitor) and ICM (Intergrated Control Motor). ICM is also known as a variable speed motor. The ICM is more efficient through a broad range of fan speeds.

Heat pump
This outdoor unit provides high efficiency heating and cooling with maximum reliability for long lasting comfort and energy savings. Heat pump efficiency ranges from 16 SEER (Seasonal Energy Efficiency Rating) and up to 9 HSFP (Heating Seasonal Performance Factor)

ERV/HRV
These are ventilators that remove stale, polluted indoor air and replace it with fresh outdoor air. At the same time it recovering heat from the inside air before it is expelled outside

Figure 2.3.4.4 The Cycle Of Fan Coil Systems.

2.4 BASIC COOLING PROCESS OF SPLIT UNIT

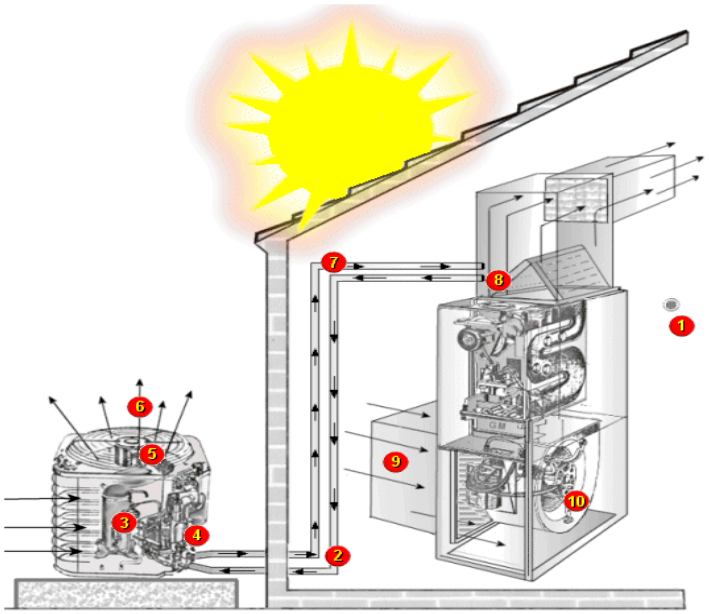


Diagram 2.4.1 The Basic Cooling For Split Unit Between Indoor And Outdoor Unit.

An air conditioner does not add cool air to an area but instead removes heat from the existing air, leaving the remaining air cooler. Oversimplified, the miracle of cooling is accomplished by the user of refrigerantcomponent such as a compressor and an evaporator. Refrigerant acts like a sponge. “Squeeze" (compress) it and the heat is expelled; let it expand and it will absorb heat. It seem that if squeeze it outside, the heat is expelled into the air; bring it back into the house and let it expand and it will soak up more heat from within.

A Visual Sequence of Events show the thermostat (1) simultaneously energizes indoor blower (10), outside condenser fan (5), and compressor (3). Refrigerant (2) enters compressor (3) as a low temperature (LT), low pressure (LP) gas. Compressor's (3) "squeezing" action converts LT/LP gas to high temperature (HT), high pressure (HP) gas as it leaves compressor and enters condenser coil (4). Condenser fan (5) transfers heat from HP/HT gas to the outside air (6); this reduces gas to HP/LT liquid (7). HP/LT liquid (7) leaves condenser coil (4)

To activate this system and enters evaporator coil (8) through a narrow orifice (expansion valve). As liquid expands, it loses pressure reverting back to a LT/LP gas. This LT/LP gas, flowing through the evaporator coil (8), absorbs heat from the return air (9) circulated over the evaporator coil (8) by the indoor blower (10) and returns (2) to the compressor (3) to start a new cycle.

CHAPTER 3

3.1 THE IMPORTANCE MAINTENANCE WORKS ON AIR CONDITIONING.

In any cooling system problems always exist in the form of electricity or cooling breakdown or due to a combination of both. Mechanics or technicians are highly skilled and competent considered when successfully detect the exact cause of the damage and successfully repair the damage.

The efficiency of detect and repair is important that significant in terms of cost and time. The technician is considered a valuable asset to his employer if it has high efficiency and skills. Failure to properly detect damage can caused loss and wasting time.

A refrigeration and air conditioning systems that are not functioning properly should be detectable the damage to the cause of the damage and the action to be taken. During repair the damage and the cause and action to be taken to prevent the same breakdowns occur. During the repairing work, the precautions should be taken to avoided possible breakdown repeated.

Damage in the cooling can occurs even to the electrical system, eg a system that uses the air conditioning compressor or Hermetic type airtight lack of coolant will cause suffering extreme heat. It is because, the suction gas returning to the compressor is not only back to the compressor but also to cool the compressor motor winding coils. When the air conditioning system is the lack of refrigerant oil the suction temperature will be high, with the coil turns the compressor will be hot because there is no cooling is done.

The effects of this damage can result in burning motor coils. As a result of the compressor motor system has now been contaminated by dirt and carbon. If the system is not repaired properly then the damage will be repeated again.

3.2 TYPE OF MAINTENANCE

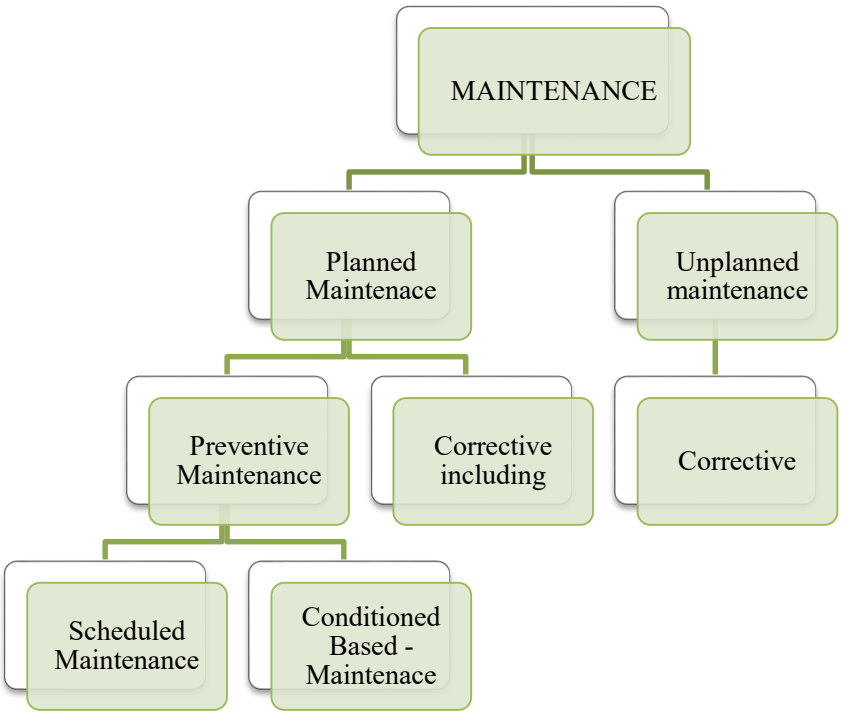


Figure 3.2.1 The Type Of Building Maintenance Management Followed By The British Standard 3811

In UiTM Perak, the maintenance managemanet used is same followed by the British Standard 3811 priority. The goal is same because the main function is to measure the system always give excellent performance at the level of the right ability.

Fleksibels and systematic maintenance help prolong the lifespan of the components in the system and make sure the system is not easily afflicted with problems and damage during operation, and a good maintenance help mechanics for the future in resolving work.

The maintenance on the system involves the following tasks as cleaning and servicing, inspection and record and report.

3.3 PROFESSION INVOLVE

ENGINEERING
Conduct research, give advice on design, directing on production of machines, machinery, plant industry, and equipment and give an advice and direction as well as maintenance and repair functions or study and advice on technological materials, products or processes.

ASSISTANT MECHANICAL ENGINEERING
Give an advice and design a system and equipment of heating, ventilation and cooling clot.

MECHANICAL TECHNICAL
Monitoring the system to still in good condition and affordable to give higher and maximum performance.

COOLING MECHANICAL
Responsible for making maintenance work on AHU, ducting cleaning, repair and installation on the system such as airconditioning, Refrigeration, cold room and so on.

3.4 THE WIDE VARIATION OF AIR CONDITIONING SYSTEM IN UITM SERI ISKANDAR PERAK

Building air conditioning system is very important in play its role as a primary cooling system for giving comfort to building occupants of the building so that they provide the best performance and discomfort decreased the effect of ambient temperature in the building.

There is a wide variation between the uses of air conditioning systems:

<table>
<tr><th>Nos</th><th>Typed</th><th>Location</th></tr>
<tr><td>1.</td><td>Centralised System

 
Diagram 3.4.1 The Chiller Plant.

 
Diagram 3.4.2 The Indoor Chiller.

 
Diagram 3.4.3 The Cooling Coil Components.</td><td> 
Diagram 3.4.4 The AHU That Is Located At The Librarian Building.

 
Diagram 3.4.5 The Library That Have Supply Cool Air From Chiller Plant Room.

Description

There are two types of cooling system weather through water cool or air cool. The centralized system involve a big chiller plant room to consist various component such as compressor and so on while the AHU room only receive the cool air to be pass to the choice room.</td></tr>
</table>

<table>
<tr><th>Nos</th><th>Typed</th><th>Location</th></tr>
<tr><td>2.</td><td>Package Unit

 
Diagram 3.4.6 The AHU Unit.

 
Diagram 3.4.7 The Air Filters Of AHU Unit Function Is To Suction The Heat Through The Surrounding Of The Room.

 
Diagram 3.4.8 The Compressor</td><td> 

Diagram 3.4.8 The AHU Room

 
Diagram 3.4.9 The Dewan Seri Iskandar that located the AHU Room.

Description

In package unit, all those component is consist in AHU Unit that include the basic component such as evaporater, condenser and others in one unit and the cool air is supply to the building through the ducting.</td></tr>
</table>

<table>
<tr><th>Nos</th><th>Typed</th><th>Location</th></tr>
<tr><td>3.</td><td>Split Unit

 
Diagram 3.4.9 The Indoor Unit

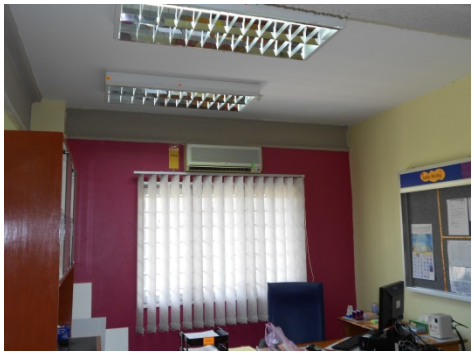
 
Diagram 3.4.10 The Outdoor Unit</td><td> 
Diagram 3.4.11 Condition Of Aircond In An Office.

Diagram 3.4.12 Healthty Office Department

Description

Split unit types are divided into two units whereas one unit is locate into outdoor while the other unit is located into indoor of the building. Indoor unit is consisting evaporator while the outdoor unit is consisteng the the compressor, condenser and the valve. There are several types of split unit typed wall mounted, syilling ceiling mounted, and ceiling suspended.</td></tr>
</table>

3.5 PERIODIC WORKS AND MAINTENANCE SERVICE ON AIR CONDITIONING

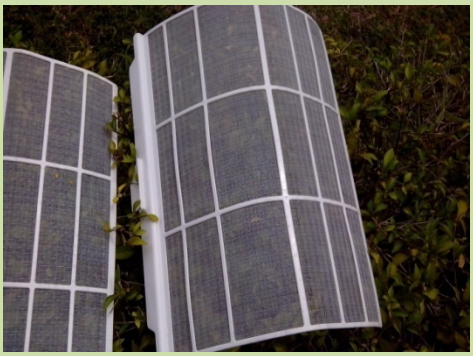
	Service Unit	Description
1.	Indoor Unit  Diagram 3.5.1.1 The Cleaning Of Indoor Unit  Diagram 3.5.1.2 Carefull Cleaning The Cooling Coil Of Indoor Unit.  Diagram 3.5.1.3 The Air Filters Is Dry Under Sunlight	▪ Wash the air filter designed to prevent dirt and dust, pollen, mold and spores, dander, viruses and smoke from entering penyenjat ▪ Servicing is required when using chemical evaporator is located in a very messy situation, where do is disconnect the supply of electricity and indoor and outdoor units ditanggalakan and chemical spray on the surface penyenjat done thoroughly. Frame and re-installed wiring.

Figure 3.5.1 The Works And Maintenance Service On Indoor Unit.

	Service Unit	Description
2.	Outdoor unit  Diagram 3.5.2.1 The Suction And Supply Air  Diagram 3.5.2.2 The Cooling Gas  Diagaram 3.5.2.3 The Drop Water From Evaporator In Indoor Unit	▪ Inspect drain pipes to prevent the effects of frost accumulation of dust and dirt that clog drain pipes ▪ Checking the gas pressure in the system, plus gas if found to decrease

Figure 3.5.2 The Works And Maintenance Service On Outdoor Unit

	Service Unit	Description
3.	AHU unit  Diagram 3.5.3.1 The AHU Unit  Diagram 3.5.3.2 The AHU Air Filters  Diagram 3.5.3.3 The Cleaning on Air Filters	▪ Checking the fan motor and blower motor on the unit in ▪ Check all capacitors ▪ Checking the oil volume refrigent at the volume level set to prevent damage to the compressor ▪ Cleaning the air filters of AHU Unit.

Figure 3.5.3 The Works And Maintenance Service On AHU Unit

	Service Unit	Description
4.	Water pump  Diagram 3.5.4.1 The Several Water Pump At The Chiller Plant Room  Diagram 3.5.4.2 The Water Pump	▪ Cleaning the surface of water pump that is filled with the dusk and so on. ▪ Wash the screen filters or the basket filters that is occupied with the rubbish, dust, pollen, algae and other

Figure 3.5.4 The Works And Maintenance Service On Water Pum Unit

	Service Unit	Description
5.	Cooling Tower  Diagram 3.5.5.1 The Cooling Tower  Diagram 3.5.5.2 The Algae That Present In The Water  Diagram 3.5.5.3 The Clean Water	▪ Cleaning the present of the small rubbish and algae and others.

Figure 3.5.5 The Works And Maintenance Service On Cooling Tower

	Service Unit	Description
6.	Chiller Unit  Diagram 3.5.6.1 The Chiller Unit  Diagram 3.5.6.2 Mechanic Change The Breakdown Compressor  Diagram 3.5.6.3 The New Installation Compressor	✚ Priority maintenance on Chiller unit because any breakdown occurs will shutdown the entire cooling air in the building both that receives cool air from chiller room plant. ✚ Refrigent fluid that runs the compressor is check on time. ✚ Routine check on water pressure.

Figure 3.5.6 The Works And Maintenance Service On Chiller Unit

3.6 THE INSTALLATIONS WORKS OF SPLIT UNIT AT CITU OFFICE

The split unit typed wall mounted has been installed at the lecturer office CITU to replace the breakdown one. The choosen of split unit is really suitable because its need a small BTU to cool the area that is need to trying cool. The installation of new air cond involves two workers from CMA sdn.Bhd, Basic Network Sdn Bhd, and Enggang Ria Sdn Bhd. They all responsible to do jobs for a period that is consent based on they contract.

The split unit is easy for an installation because it involve two units such as indoor unit and outdoor unit and without ductwork installation. The indoor unit is mount at the interior wall while the outdoor unit is place at the outdoor exterior wall weather it is lay on pad of concrete or at the flat surface.

Diagram 3.6.1 The Installations new unit at the CITU Office

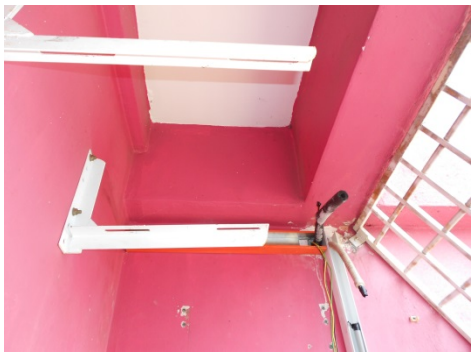


Diagram 3.6.2 The Slab To Mounted The Outdoor Unit

Diagram 3.6.1 and 3.6.2 shows the indoor and outdoor unit is mounted on the wall and this show that the installation of air conditioning split unit type wall mounted.

The drill is used to create a hole at surface wall to run the copper line as the channel for the gas suction pipes and discharge pipe and to through the pipe line and pvc drain line.The electrical cable connections is installed, and diperkemaskan di dalamtrunking.

The copper pipe, power cable is bind together. The lock valve is open and closed with an Allen wrench at the end of the installation, so that the gas in discharge pipe and suction pipe will not escapaing. A copper connection pipe and electrical wiring connects the indoor unit to the outdoor unit of the split air conditioning. Gas refrigerant is pumped from the outdoor condenser coil and compressor through the connections pipe to the indoor unit. A fan then quietly distributes cool air drawn across the unit’s evaporator coil.

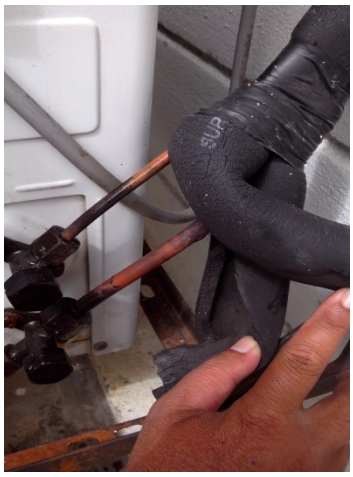


Diagram 3.6.3 The Valve Is Closed Up By Using The Wrench

Diagram 3.6.3 The Gas Pressure Is Measured Using Metering Pressure

3.7 THE WORKS AND MAINTENANCE SERVICE ON AIR CONDITIONING SYSTEM AT THE KOLEJ PASIR SALAK OFFICE

Before performing any maintenance management, make sure that the air conditioner and power supply was shut down. Air filter behind the air inlet hole should be cleaned at least every two weeks or as needed. If the air filter is blocked with dust, air conditioner capabilities will come down, and as much as 6% of the electricity used to run the air conditioner will be wasted.

Below shows the work of the filtered cleaning works of dust, pollen and so on of air filter from entering the evaporator.

Diagram 3.7.1 The Indoor Unit.

- Air filter cloth or hampages used to suck dirt located on the air filter.

Diagram 3.7.2 The Air Filters Is Wash In An Open Space.

- Next, wash the air filter under the tap open to remove the dirt that has accumulated on it. If the air filter is too dirty detergent such as soap powder used.

Diagram 3.7.3 The Cleaning Of Cooling Coil.

- Indoor unit is wiped off with a soft and dry gently. Hampages cleaners also are used if necessary to suck the dirt that is stuck in between the cooling coil.

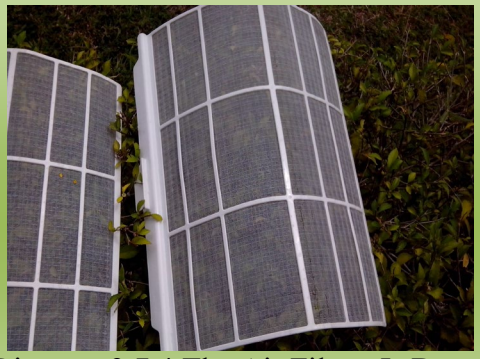


Diagram 3.7.4 The Air Filters Is Dryed Under The Sunlight

- Dried under the sunlight for drying purposes.

Figure 3.7 The Cleaning Works On Indoor Unit And Outdoor Unit

The continue use of air conditioners without repair and accumulated dust and dirt that degrade performance and cause unpleasant odors presence. Air conditioner should be checked as often as possible and will require minimal maintenance. It is recommended that filters will need to be cleaned initially every 2 weeks. However if filters are clean, the minimal maintenance change to monthly and the cleaning involve using a vacuum cleaner or warm soapy water.

CHAPTER 4

4.0 PROBLEM AND RECOMMENDATION

The cost installation of an air conditioning system is really higher, and UiTM Seri Iskandar, Perak also faced same problem that related the cost or money. The installation between small unit and large air conditioning unit need different amount of money. For example, the air conditioning used at the Pusat Islam whereas the placed of prayer room at the second level whereas the ground level that is functioning as the hall for an examination did not get fully cool air because the used of package system and multi split unit air conditioning system. The used of this typed air conditioning system bring problems to the occupied because the cool air that is supply can not reach the suitable and comfortable temperature. This is because the presence of large group of occupant that occupied the hall make the heat at the room is became higher than the process of cooling air that takes time.

CHAPTER 5

5.0 CONCLUSION

Maintenance work on air conditioning is service to clean the air filters. An air-conditioning unit or either type of wall should be maintained as far as possible. The intended is to give benefits to owners because the well ongoing maintenance decreases wastage. For example, the monthly servicing of split type air conditioner units have made a significant profit to the owner in terms of decreases of electricity wastage occurs.

Following well as, an air conditioner with good maintenance, problems such as emergency damage can be prevented because the damage has already been predicted and before the occurrence damage occur.

Maintenance work when the air conditioner is started, information on the Development and Facilities Management in each zone has been assigned to play their role well run by Major Facilities Management as mechanical damage complaints. Complaint is brought and presented to the Mechanical Technician and ready to handle a possible damage.

However, mechanical technician jurisdiction is very limited and only includes monitoring of maintenance of air-conditioning systems as a result of cooperation subsidiaries and contractors responsible for the agreed contract.

There are some parts of the maintenance work such as emergency work and the work of the contractors periodically conduct appropriate work as agreed in the contract documents. For works ad hoc or unplanned itself requires the contractor to make an estimate of the cost of replacement either very high or vice versa. Further, the contractor issuing invoices or quotes to crimp their money back. Invoice is the bill that contains the commercial nature of the evidence and information in respect of transactions carried out between the two sides.

The work done is the work of an organized, flexible and able to address the problem that will arise from time to time. This is because the work planned based on the predicted damage to avoid any damage

The air conditioner system is maintained by 3 company, that is appointed in doing maintenance work either on a daily, monthly, or yearly basis or whether emergency work to be done if the air conditioner undergoing breakdown, the 3 of these company, is CME Enterprise Sdn Bhd, Basic network Sdn Bhd, and Enggang Ria or the company partnership know as Mozzaz Sdn Bhd.

They are a subsidiary of a recognized group and experienced in handling the mechanical cooling here. In addition, cooling mechanics perform maintenance work until the maintenance of the damage either regular work or not, are affordable to be maintain and then is left entirely to the contractor or the contractor to perform the job.

Meanwhile, the selection of its subsidiaries or contractors who are appointed based on their qualifications after bid opening and they are entitled to them and their contract to give

service towards UiTM started based on certain periods specified. The tender and contract is described as contract system that is divided into two types, such as the periodic contract system is whereas is a contractor is bound to carry out certain maintenance work for a prescribed period. The contract period is dependent on the maintenance work done and may be renewed depending on maintenance work done and likely will be renewed at the discretion of the issuing tenders.

A periodic term contract system also is where the contractor selected is not tied for long periods as under the contract system periodically. It is only responsible until maintenance is completed.

The selection subsidiaries or contractors in the maintenance system is suitable when appropriate have been selected by the Jawatankuasa Bendahari of the Committee based on their selection of factors in terms of financial resources, knowledge and skills that are owned by the workers and have enough employees during an emergency and safety conscious.

REFERENCE

REFERENCE:

1. www.climatemaker.com
2. www.splitunit.com
3. www.airconditioning.com
4. www.wikipedia/aircond.com
5. www.basiccooling.com
6. www.aircond/history.com
7. www.coolingsystem.com