



اَبُو بَكْرٍ سَيِّدِي تَبَاكَوْا لِيْ كِيْفِيْ مَارَا
UNIVERSITI
TEKNOLOGI
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BUILDING DEPARTMENT

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

MARA UNIVERSITY OF TECHNOLOGY

(PERAK)

APRIL 2013

It is recommended that the Practical Training Report is prepared

By

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2010135929

Titled

INSTALLATION OF NOVEC 1230 SUPPRESSION SYSTEM

Accepted as partial fulfilment of the requirement to obtain Diploma in Building

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(PERAK)

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STUDENT'S DECLARATION

I hereby, the work of writing this Practical Report was produced entirely by me except as expressed through practical training that I went during 5 months from 12 November 2012 until 12 April 2013 in Eastco Engineering Sdn. Bhd. It is also one of the requirements to pass the course DBN 307 and received partial fulfilment of the conditions of containing a Diploma in Building.

.....

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Thank you.

ABSTRACT

This report briefly explains about process of installation of fire suspension using novac 1230 system. It was completed throughout the experience during the 5 months practical training at Eastco Engineering Sdn. Bhd. Even though directly involved with the project, based on the observation of the installation novac 1230 system at the Telekom Malaysia is a thing that should be emphasized. All materials and tools used during installation of novac 1230 system are explained in detail. In conclusion, this report explains in more detail the operation, and installation of this system.

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LIST OF ABBREVIATIONS

NIOSH National Institute Of Occupational Safety & Health

CIDB Construction Industry And Development Of Building

KFP Kiddle Protection

HVAC Heating,Ventilation And Air Conditioning System

EMT Electrical Metallic Tubing

CHAPTER 1

INTRODUCTION

1.1 Introduction

This project is about the fire systems that having in the building either for maintenance and installation of fire system. This system normally use at the public or government buildings that have been installed in order to prevent, control the fire either as a manually or automatically. The type of NOVEC 1230 system is the latest fire protection system that was been use in TM 1 Malaysia. Fire protection systems are usually maintained or installed accordance with the specified date which is that called the permit. Besides that, it also has a condition where the employees should have the CIDB green card or NIOSH TM where it protects the employees from an accident while at the work place.

Fire prevention equipment is the fire alarm systems that are installed permanently and it will automatically operate in that building. These fire prevention systems normally exist in the buildings such as high rise or tower. Besides that, certain building or premises still using the manually system in order to give warn or alarm for occupant in that building. How the way that will cause the fire? Usually, the fire happens because of the chemical reaction when the combination of the combustible material and oxygen, than it meet the heat. Element in oxygen normally has a gas that support the fire, while the heat is the energy to increase fire limit until it ignites. However, the fire occur not only cause the loss and destruction of the property but the biggest things is loss of life.

From these cases, it important to find what the causes that fire can happen. Fire can happen in many places such as residential or industrial property. The causes of fire that normally found in the workplace is welding spark, firework, matches, lighters, cigarette butts, leakage or gas compression, mechanical heat, short-circuit due to cable insulation cracks, heating due to terminal connection losses, fitting in term of the use of the wire sizes and fuses, electric current leakage cause by damage of the cable or insulation. Moreover, the natural factor also can be part that occur the fire such as drought and volcano eruption.

TYPE	COLOUR	DISTANCE OF FLOW	TIMING FLOW	RECORD
WATER	RED	4 metre	120 sec	Not suitable types for B, E
FOAM	YELLOW	6 metre	30 - 90 sec	Can be frozen. Not suitable type for E
GAS	BLACK	3 metre	120 sec	Not effect
DRY DUST	BLUE	3 – 6 metre	120 sec	Dirty effect

Table 1.2 type of fire extinguisher

Active fire protection is a protection that been installed in a building. It functions to detect, warning, control and extinguish whether operate in manually and automatically. Many type of active fire protection such as alarm broken glass, heat detectors, smoke detector, sprinkler, wet riser, dry riser, fire hydrant, hose reel, gas co2 system, and NOVEC 1230 system. For glass breaking device it operate in manually by using the glass break. When the glass on the box is broken, the electrical circuit will complete, from that it can produce a warning bell that give the sign which zone or area that fire happen. The heat detectors operate in automatically system, where it wills active the fire alarm system when it detects the heat or temperatures in the early stage of fire. Besides that, the systems for smoke detector are automatically. This system normally to activate the sign of fire where this system can detect a certain amount of smoke. In addition, installations of sprinkler system are designed to control the fire at the early stage. The way how the sprinkler work is using the water spray that already set the temperature on the area that involve in fire. This system connected to the fire alarm and it works automatically. For water carbon dioxide (co2) and NOVEC 1230 system, it uses the combination of heat and smoke. When the heat or smoke it detected, it will operate automatically that come out with the gas. These systems are suitable to install in a building in order to protect the equipment at there.

1.2 objective of study

This report contains five (5) objectives:

- i. To understand the materials, apparatus used to install and service the fire fighting system.
- ii. To understand the party/parties involved and problems occurred in services and installation of fire fighting system.
- iii. To understand the method of services and installation of fire fighting system.
- iv. To understand the planning to make the work done.
- v. To understand designs and arrangements of such systems should be carefully evaluated for compliance with the ABS requirements by the designer.

1.3 Scope of study

The scope of study of this report covers the types of fire suppression system to be built with its applications. The type of fire suppression system is depends in the building. In other hand, it also covers all materials and tools and also machineries from burning. The process or method of fire suppression would also explain in this report using the novac1230 system. Furthermore, there is also explanation about operation and equipment of this system. Besides that, there is also explanation about the requirement of the system using novac 1230. Moreover, there are also explained about standard of installation must be follow the rules like install the panel must be install 5 feet from ground, install the bell, flushing light, evacuate, size of pipe, trunking, conduit and the colour of the pipe must be follow the rules.

The scope of study is focus on the installation of fire fighting system using novac 1230 system at the Rawang, Selangor.



Figure 1.1: Plan to TM Rawang

Source: Google image



Figure 1.2: Site of installation novoc 1230 system

1.4 Method of study

1.4.1 Main method

I. Observation

With observation method, a lots of input can be gained. This type of method is an effective learning method and can increase the level of knowledge about the fire fighting installation. Besides that, using this method can know how to design the piping follow the condition of the room. Besides that, the authentic of works can be clearly seen by using this method.

II. Interview

Interview is one of several methods used which is very effective in gaining much information. This method can be done by directly face to face meeting and interviewing with the person. Besides that, he surely has more experience on the works, experts and knows all the problems that could occur. Here is the example list of interviewee,

- i. Mohd Zaimi bin Mohd Idris
Project Director

- ii. Ismail bin Zakaria
Senior Technical Supervisor

- iii. Ahmad Shafiee
Senior Specialist in Piping System

- iv. Mohd Anuar
Senior Specialist in Wiring System

1.4.2 Secondary method:

I. Electronic media

Electronic media is the easiest and fastest method of study that can be used to gain any type of information. An example of electronic media method is the facility of internet. With using the internet, can quick learning method process of fire fighting system because have an explanation along with diagram.

II. Book Reference

This type of method of study is a very supportive method in gaining any information about the fire fighting. This method is one of the easy methods of study because reference books can be found at any library and bookstore.

CHAPTER 2

BACKGROUND OF COMPANY

2.1 Introductions

Eastco Engineering Sdn Bhd (Reg. No. 584446 P) was previously known as Eastern Engineering Company. This company incorporated in the year of 1985. It was established primarily as a contracting firm, in the field of Fire Protection System for the Construction industry in Malaysia, involving in commercial and industrial installation. This company are registered with Pusat Khidmat Kontraktor, CIDB, and Telekom Malaysia Berhad. This company provide comprehensive advisory and project management service when required.

Up to date, Eastco Engineering Sdn. Bhd has successfully completed jobs with its technical expertise and capability, sound financial standing and excellent track record. This company believes in its role of fulfilling the market demand by producing high quality service. This company is also the Authorized Distributor for the Kiddle Fire Protection (KFP) KD 1230 Novec fire suppression system.

As a distributor, Eastco Engineering Sdn. Bhd. is responsible for promoting and implementing of KFP's KD 1230 gaseous fire protection system using 3M's Novec 1230 fire protection fluid in Malaysia. In addition to our strong technical and engineering know-how for KFP's product and system, Eastco Engineering Sdn Bhd have a high level of commitment and integrity necessary to recommend and implement the Novec 1230 gaseous fire suppression system to end customer in Malaysia.

2.2 Company Profile

Name	Eastco Engineering Sdn Bhd
Managing director	Ir. Zahal bin Mohamed
Project director	Mohd Zaimi bin Mohd Idris
Address of company	No. 43 Jalan Pluto AZ U5/AZ, Seksyen U5, 40150 Shah Alam, Selangor.
Telephone No.	
Facsimile No.	03-78423292
No. Registration Company	Reg.No 584446 P
Date of incorporated	Year of 1985
Status of company	SDN. BHD company
Business activities	-fire protection system -Air conditioning ventilation system -Pumping installation -Sewage treatment plant installation -Water treatment plant installation -Booster system

Certificated government work

Gred- G5

Categories

-ME (Mechanical and Electrical)

-CE (Construction of Civil work)

-B (Building construction)

CIDB

Gred-G5

Categories

- ME: M15 M19 M01 M02

- CE: CE21

- B : B04

Pusat Khidmat Kontraktor(PKK)

Gred-G5 (Bumiputera)

Kementerian Kewangan Malaysia

Bumiputera

Kepala dan sub kepala:

030100, 030200, 130100, 140100

200300, 220101, 220103, 220115

2.3 Organization Chart

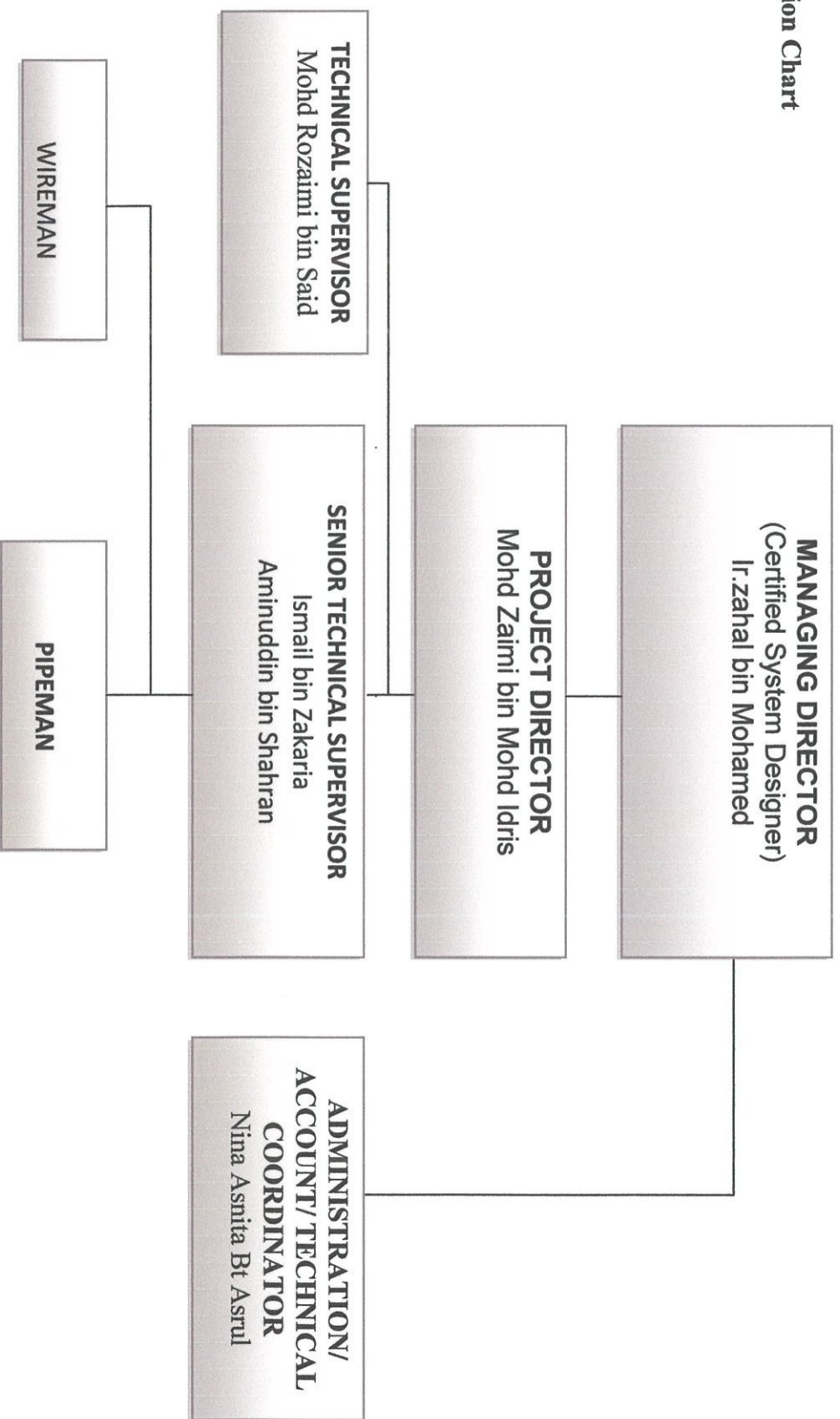


Figure 2.1: Organization chart of Eastco Engineering Sdn Bhd

2.4 list of projects

2.4.1 List of previous project.

ITEM	PROJECT TITLE	NATURE OF WORK	CONTRACT VALUE
1.	Tv3 Sub Station, Keldang Hill, Perak Darul Redzuan	Halon system installation	RM 25 000.00
2	PKNS shopping Complex section 6, Shah Alam, Selangor	Sprinkler system, Hydrant system, Fire alarm & Halon installation	240 000.00
3	Telekom Malaysia Sub station, Johor Bharu	Co2 fixed system installation	150 000.00
4	Shah Alam & Alcom Petaling Jaya	Pressurised hydrant system, Micro P based, Fire Alarm, Hose Reel, Co2 fixed installation	850 000.00
5	MOU Martello, Bukit Ibam, Pahang	Wet Riser, Micro P Based, Fire alarm, Hose Reel, Co2 fixed installation	800 000.00
6	View Resort Phase 4, Pahang	Co2 Fixed System Installation for telecommunication Cabin & switching Center	1,014 468.00
7	Mutiara Telecommunication & Switching Centers, Kuala Lumpur	Dry Riser, Addressable Fire Alarm, Hose Reel system & Co2 Fixed installation	1,029 276.00

8	Medical Center, Selangor	Fire alarm, Hydrant system & Co2 Fixed Installation	950 000.00
9	Tamreco Factory, Johor Bahru	Wet Riser, Sprinkler, Addressable fire alarm system & Co2 fixed installation	454 840.00
10	Institut Profesional Baitulmal, Shah Alam, Selangor	Sprinkler, fire alarm, hose reel & Co2 Fixed system installation	1,230 068.00
11	University Malaya Akademi Islam (AIUM), Kuala Lumpur	Co2 Fire Alarm, Wet Riser System Installation	1,000 000.00
12	PKNS-M, Taman Setiawangsa, Kuala Lumpur	Fire protection system (servicing) sprinkler system, addressable fire alarm system & Co2 fixed Installation	2,117 200.00
13	Maintenance for Royal Malaysian Air Force Maintenance for Dewan Bandaraya Kuala Lumpur (DBKL)	Fire protection system (servicing) Booster, sprinkler Co2 system, portable extinguisher, Fireman intercom, hose reel, water mist, wet riser & fire alarm system	594 720.00

2.4.2 Upcoming project

ITEM	PROJECT TITLE	NATURE OF WORK	CONTRACT VALUE
1	Proposed, Design, supply, deliver, Install, testing & commissioning of Novec 1230 fire suppression system and halon replacement for Telekom Malaysia Berhad, Kuala Lumpur and Johor Bharu	Installation of novac 1230 system	*to be updated.

CHAPTER 3

CASE STUDY

3.1 Introduction

Throughout the practical training for five months, has been given the task of to provide practical training report. This assignment dedicated to equipping on of the requirements to pass the practical training. This case study is located at Telekom Malaysia Rawang, Selangor. Moreover, in case of any problems related with this project, Eastco engineering. Sdn. Bhd should be referring to the Telekom Malaysia. Additionally, Eastco engineering should finished their work follow the period that has been given to install the fire suspension using novac 1230 system.

Besides that, the design and installation of this system is done by Eastco Engineering. Sdn.bhd. because in Asia, this product is brought by Sevo and Kidde Protection (KFP) and Eastco Engineering Sdn Bhd be an authorized distributor KFP fire protection product. This company also responsible for promoting and implementing of KFP KD 1230 gaseous fire protection system. This project title is to installation the fire suspension using novac 1230 system at Rectifier room, Gunset & Msb room and the fiber room at Telekom Malaysia Rawang, Selangor. Before starting the work, all workers must have a TM safety passport (NIOSH) to enter the area of Telekom Malaysia. The total cost of this project is RM500,000.00 and the period to done this work is two month.

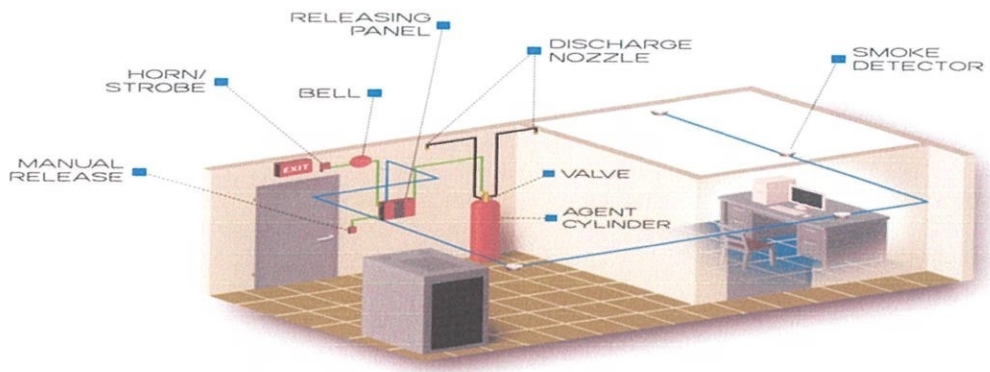


Figure 3.1: Example of Novec system install at Telekom Malaysia

Source: Google image (www.google.com.my)

3.2 Background Of The Project

The project started on 3 December 2012 and finished on 3 February 2013. The project has three rooms which rectifier room at ground floor (Figure 3.3), Genset & MSB room at ground floor (Figure 3.4), and fiber room at 1st floor (Figure 3.2). Besides that, all the room has a different design to install the piping and wiring because has a different size and condition the equipment of the room. The fire suspension used is novoc 1230 because this system is a next generation halon alternative designed to balance industry concern for performance, human safety and the environment which are the first option to non-sustainable technologies because there a zero ozone depletion potential, atmospheric lifetime and the global warming potential.

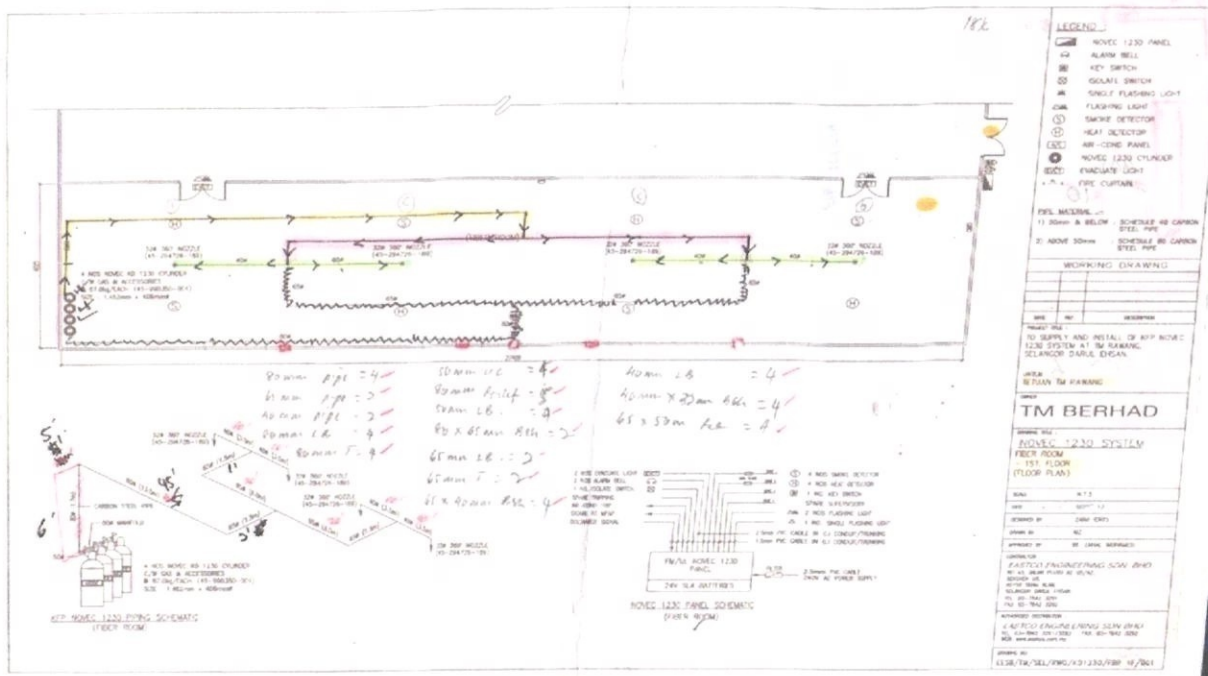


Figure 3.2: Fiber room at 1st floor

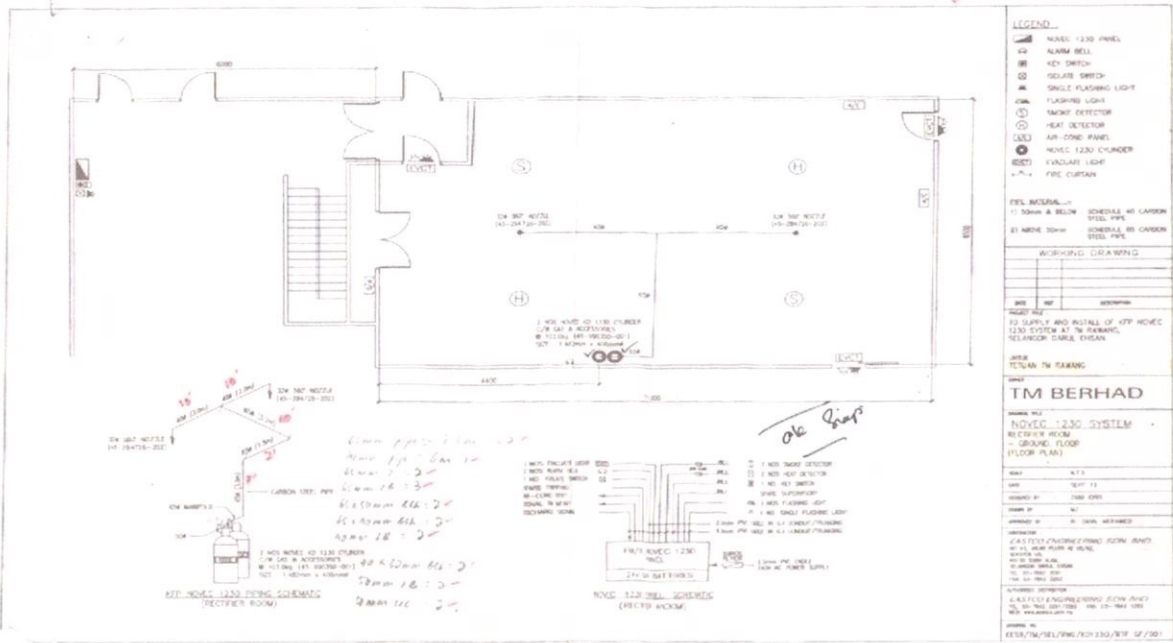


Figure 3.3: Rectifier room at ground floor

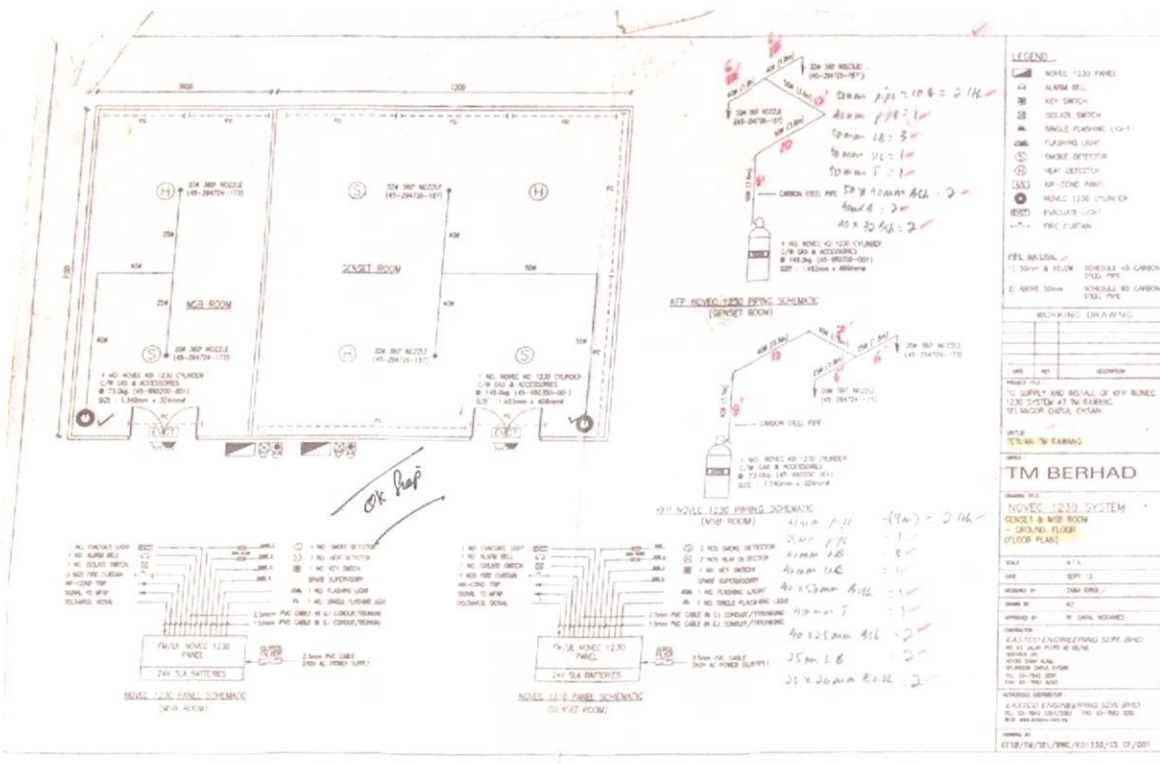


Figure 3.4: Genset & Msb room at ground floor

3.3 Case Study

3.3.1 Introduction

Novec 1230 fire protection fluid is a next generation halon alternative designed to balance industry concern for performance, human safety and the environment which are the first option to non-sustainable technologies because there a zero ozone depletion potential, atmospheric lifetime and the global warming potential. Besides that, novoc 1230 system is a clean agent fire suppression system than another gas because novoc 1230 fluid will turn to a gas upon discharge making it an effective total flooding agent for a variety of hazards.

The handling of this system better than other gaseous because is not pressurized and does not have a high vapor pressure at room temperature. The material of novoc 1230 fire protection is stable and essentially inert, meaning it does not react with system component and it is also non corrosive in its neat form. This system is clean agent and do not affect the sensitive high value electronics such as telecommunication switch room, computer and electronic control rooms, critical military application.

In asia, this product is brought by SEVO and KIDDE PROTECTION (KFP) and Eastco Engineering Sdn Bhd be an Authorized Distributor KFP's fire protection product. This company also responsible for promoting and implementing of KFP's KD 1230 gaseous fire protection system.

3.3.2 System requirements

I. System Description and Operation

The system shall be complete in all ways. It shall include a mechanical and electrical installation, all detection and control equipment, agent storage containers, Novec 1230 agent, discharge nozzles, pipe and fittings, audible and visual alarm devices, auxiliary devices and controls, shutdowns, alarm interface, advisory signs, functional checkout and testing, training and any other operations.

The general contractor and/or owner shall be responsible for securing the protected spaces against instrument loss and/or leakage during the 10-minute "hold" period. The detectors shall be Cross-Zoned detection requiring detectors to be in alarm before release such as transmit a signal to a fire alarm system, shut down the HVAC system, light an individual lamp on an optional annunciation, illuminate the alarm lamp on the control panel face.

The system shall be capable of being actuated by manual discharge devices located at each hazard exit. Operation of a manual device shall duplicate the sequence description above except that the time delays and abort functions shall be bypassed. The manual discharge station shall be of the electrical actuation type and shall be supervised at the main control panel.



Figure 3.5: Air conditional panel



Figure 3.6: evacuate lamp

II. Design of piping

1. The system design can be modular, central storage, or a combination of both design criteria.
2. Systems shall be designed in accordance with the manufacturer's guidelines.
3. Each supply shall be located within the hazard area, or as near as possible, to reduce the amount of pipe and fittings required installing the system.
4. Distribution piping and fittings shall be installed in accordance with the manufacturer's requirements, NFPA 2001, and approved piping standards and guidelines. All distribution piping shall be installed by qualified individuals using accepted practices and quality procedures. All piping shall be adequately supported and anchored at all direction changes and nozzle locations.



Figure 3.7: distribution of piping



Figure 3.8: piping support with bracket

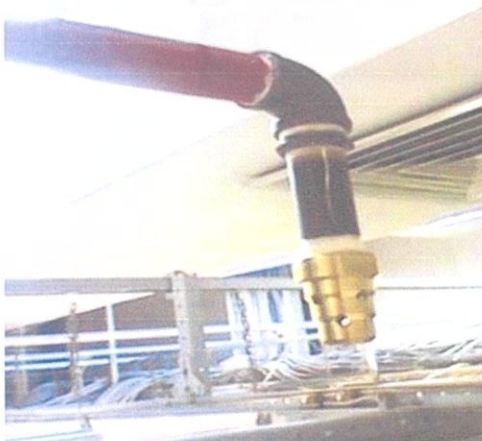


Figure 3.9: nozzle pipe

III. CONTROL PANEL

1. The detection control system and its components shall be UL listed and FM approved for use as a local fire alarm system with releasing device service.
2. The control system shall perform all functions necessary to operate the system detection, actuation, and auxiliary functions.
3. The control system shall include battery standby power to support 24 hours in standby and 5 minutes in alarm and install 5 feet from floor level



Figure 4.0: Control panel

IV. Audible and Visual alarms

1. Alarm audible and visual signal devices shall operate from the control panel
2. A strobe device shall be placed outside, and above, each exit door from the protected space. Provide an advisory sign at each light location.



Figure 4.1: advisory sign

VI. System and control wiring

1. All system wiring shall be furnished and installed by the contractor.
2. All wiring shall be plenum rated two conductor fire wire, run without conduit. If required by local electrical or fire codes, the system wiring shall be installed in electrical metallic tubing (EMT), or conduit. In either case, system wiring must be kept separate from all other building wiring.
3. All system components shall be securely supported independent of the wiring. Runs of conduit and wiring shall be straight, neatly arranged, properly supported, and installed parallel and perpendicular to walls and partitions.



Figure 4.2: installation of conduit



Figure 4.3: conduit has been installing

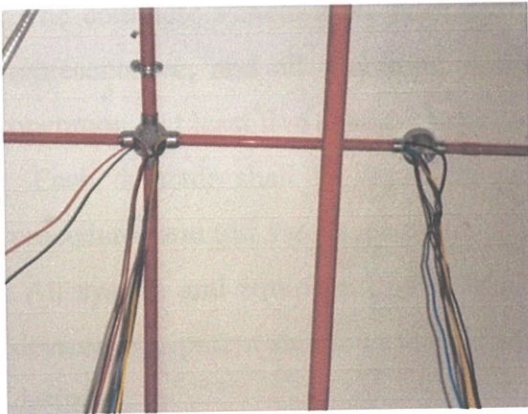

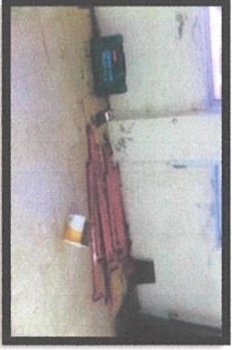
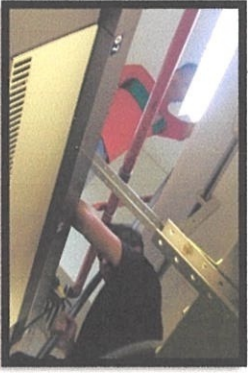
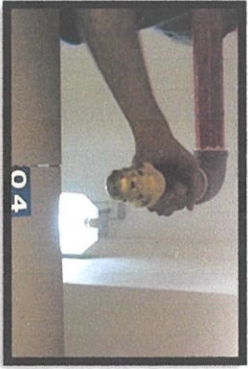







Figure 4.4: work of draw the wire

NO	OPERATION	DESCRIPTION	DIAGRAM	EQUIPMENTS	LABOR	DURATION
3.	welding work .	angle iron that were cut, paint and drill will be weld to make a bracket		Welding set, hammer and welding mask	2 semi-skilled labours.	½ a day.
4.	Fixing bracket according to pipelines	Bracket will install at beam/wall according to pipeline to easier the installation of pipe.		Wall plug, hammer, spanner 15', vacuum and hammer drill	1 installer, 1 vacuum holder and 1 labour hold the ladder for safety factor	1 day
5.	Installing of pipe	After done setting out work, angle iron(by size required) and api pipe(by size required), will be cut by were measure. angle iron will be drill to fit a u-bolt as a pipe holder to the bracket and be paint by using brown primary and secondary undercoat then follow by red signal paint as finishing.		Pipe spanner	2 labor to fit the pipe, 2 labor to carry the pipe	1 days

6.	Installing nozzle, manifold, cylinder and bracket as a holder to cylinder	Nozzle will be install after main pipe and distribution pipe were be install. Next, manifold be install with check valve and connect to cylinder.	 	Pipe spanner and spanner 13'	2 labor installing nozzle, 2 labor setting the manifold	1 day.
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3.3.6 METHOD STATEMENT OF WIRING INSTALLATION

NO	OPERATION	DESCRIPTION	DIAGRAM	EQUIPMENTS	LABOR	DURATION
1.	Setting out and designing feed of conduit.	Determine the amount and location to install heat detector, smoke detector, alarm bell, alarm control panel and all devices.		Ruler, pens	1 skilled labor	1 hour
2.	Installing conduit and trunking	Conduit will be installed according to design.		Hammer drilled, hammer, wallplug size 5.5mm, saddle, screwdriver	3 semi skilled labor	2 day
3.	Installing cables	Cable will be install through the conduit. Wire will be isntall to connecting all devices to alarm control panel.		Cables, cables puller	2 skilled labor, 2 semi skilled labor	2 day

4.	Installing devices, alarm control panel and connecting wire	All devices and control alarm panel will be install then make a cable connection to the terminal.		Hammer drilled, hammer, wallplug size 5.5mm and 8mm dia., screwdriver	2 skilled labor, 2 semiskilled labor	1 day
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CONCLUSION

In conclusion, many things that can be learned during five months of this practical training. In terms of observation, I was able to learn that the installation work is not easy because there are many barriers to complete the work until finish. For example, the barriers during installation works are the conditions of the room such as the room have a plaster ceiling, have hazard equipment that can disturb installation this fire suspension.

In addition, the problems that often happen because the design is not consideration because have barriers during hanging the pipe. The solution for this problem is the equipment should place at the forward during suspended pipe or if the fixed equipment, the workers should make their work in care. Besides that, the solution if have a plaster ceiling the workers must open the plaster ceiling before suspended the pipe. These causes can late the process installation of this system.

All the work have an own barriers, so to make the work done and perfectly without any accident at the work place, the workers should take note about safety during do the work. Lastly, during five month of this practical many term or item can learn from starting of the installation to the end of installation and the function of equipment novac 1230 system and thanks to the En.Shafiee because help me to finish this case study.

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