# Plumbing Installation

# Level – III

## Based on October, 2023, Curriculum Version II

**Module Title: Fire Hydrant and Hose Reel system Installation**

**Module code: EIS PLI3 07 1023**

**Nominal duration: 100 hours**

**Prepared by: Ministry of Labor and Skill**


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Table of Contents

## Acknowledgment

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# Acronyms

DI ............................................Ductile Iron

DN ..........................................Diameter Nominal

EMOC ...................................Emergency obstacle care

GPM ......................................Gallon per minute

ID ...........................................Inside diameter

MRP........................................Material requirement planning

NB ..........................................Nominal bore

NPS......................................... Nominal pipe size

OD...........................................Outside diameter

QA ..........................................quality assurance

QAP .......................................Quality assurance performance

NFPA...................................... National Fire Protection Association

# Introduction to the Module

A fire hydrant hose reel system is an essential component of a building's fire protection system. It provides a means for quickly and efficiently delivering water to extinguish fires in the early stages, before they can spread and cause significant damage. This module introduction will provide a comprehensive overview of the general components and functionality of a fire hydrant hose reel system.

**This module covers the units:-**

At the end of the module the trainee will be able to:

- Plan and Prepare for work
- Identify fire installation requirements
- Install serviceand test fire hydrant and hose reel system

**Learning Objective of the Module**

- Plan and Prepare for work.
- Identify installation requirements.
- Installservice and test fire hydrant and hose reel system

**Module Instruction:**

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” giver at the end of each unit and
5. Readtheidentifiedreferencebookfor examplesandexercise

## Unit One: Prepare for Work

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- OHS Requirement
- Tools and Equipment
- Preparing Work Area

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Apply OHS requirement.
- Use tools and equipment
- Prepare work area

## 1.1. OHS requirement

**Definitions of OHS Requirements**

Occupational safety and health (OSH) is a healthcare field that focuses on the safety, health, and welfare of people in their work environment. It aims to create a safe and healthy work environment, protect co-workers, family members, employers, and customers, and ensure individuals can perform their occupation without causing harm to their health. OSH is multidisciplinary and aims to promote physical, mental, and social well-being, prevent health departures due to working conditions, protect workers from adverse health risks, and adapt work to individual capabilities. Fire hydrants are often used for flushing out water line sediments, using hydrant diffusers to DE chlorinate water and avoid ground contamination. Code for America developed an "Adopt a Hydrant" website in 2011 to encourage volunteers to shovel out fire hydrants after snowstorms.

**The Regulations**

The Occupational Health and Safety Regulations 2022 outline duties and procedural matters, including licensing requirements, record-keeping, and notification requirements, under the Act.

**Policy**

Work Safe must periodically interpret legislation and act on issues to ensure clarity. In situations where new circumstances arise, such as increased non-standard employment or new industries with new technologies, Work Safe develops a policy to clarify its understanding of the legislation and its actions.

**Types of Hazards**

A common way to classify hazards is by category:

For fire installation workers, there are additional hazards that they may encounter while performing their duties. These hazards can include:

- **Electrical hazards**: Fire installation workers often work with electrical systems and wiring, which can pose a risk of electrical shocks or fires if not handled properly. They need to be trained in electrical safety practices and use appropriate personal protective equipment (PPE) to mitigate these hazards.
- **Falls and slips:** Fire installation workers may need to work at heights or on elevated platforms while installing or inspecting fire safety equipment.

This can increase the risk of falls if proper fall protection measures are not in place. Slippery surfaces or cluttered work areas can also contribute to slip and trip hazards.

- **Exposure to hazardous materials:** Fire installation workers may come into contact with hazardous materials such as asbestos or lead-based paint while working in older buildings. Proper training, use of PPE, and adherence to safety protocols are necessary to minimize **exposure risks.**
- **Confined spaces**: Some fire safety equipment may be located in confined spaces, such as crawl spaces or utility rooms. Working in these areas can present risks of oxygen depletion, toxic gas buildup, or entrapment. Proper training and safety procedures should be followed when working in confined spaces.
- **Noise exposure**: Fire installation workers may be exposed to high levels of noise from power tools, machinery, or equipment during their work. Prolonged exposure to excessive noise can lead to hearing loss if proper hearing protection is not used.
- Ergonomic hazards: Fire installation work often involves repetitive tasks, heavy lifting, or awkward body positions. These ergonomic hazards can contribute to musculoskeletal injuries if proper lifting techniques and ergonomic practices are not followed.

**Classification according to type of material under fire:**

1.**Class A fires:-**involving solid materials - paper, wood, and fabrics and so on. Cooling by water or spray foam is the most effective way of extinguishing this type of fire.

2.**Class B fires:** involving flammable liquids such as petrol, oils, fats; foam and dry powder extinguishers should be used.

3.**Class C fires: -** which are fuelled by flammable gases such as natural gas, butane and so on. Priority must be given to shutting off the source of fuel and the fire should be tackled with dry powder.

4.**Class D metal fires**: - involving metals such as aluminum and magnesium; special powders are required in such situations.

5.**Class E fires:** - in which live electrical equipment is involvement known as ‘electrical fires’). Non-conducting agents such as powder and carbon dioxide must be use

## 1.2. Tools and Equipment

### 1. General Considerations of Safety Equipment

Safety equipment is designed to help you avoid getting injured on the job. Due to its durability and layering, it helps to minimize or eliminate the physical impact if a workplace accident occurs. With safety precautions in place, employers can offer protection to their personnel.Consider the likelihood of an accident and the seriousness of a potential accident. Personal protective equipment must be selected to protect against any hazard that is likely to occur or has a serious injury impact if it does occur.

### 2. Checking and selecting Tools and equipment

Selecting and checking tools and equipment is crucial for quality assurance tasks. This ensures reliability and suitability for fire systems. Checking ensures correct, functional, and undamaged tools are used. Maintenance includes inspection, testing, measurement, replacement, and adjustment. The process should be completed after the installation, ensuring the equipment is properly placed and maintained. Maintenance plays a crucial role in reducing workplace hazards and ensuring safer working conditions, as inadequate maintenance can lead to serious accidents or health issues.

### 3. Storing tools and equipment

Storing is placing or putting the fire hydrant system and hose real systems installing/replacing tools and equipment away and keep them until you need them.

**Figure 1.1storing tools & equipment**

**4. General requirements for equipment maintenance**

- Obtaining a copy of the maintenance schedule recommended by the manufacturer.
- Ensuring that maintenance is performed as required.
- Ensuring that the person(s) performing the maintenance are competent (e.g. licensed mechanic).
- Retaining records of maintenance/service conducted.
- Specifying who is responsible for overseeing equipment maintenance and where the records are kept.
- Set up a system for removal and tagging of damaged or defective tools and equipment.

**There are two types of maintenance**

1.**Routine maintenance**: is planned and focuses on preventing future problems, while

**2. Corrective maintenance**: is reactive and happens when equipment goes wrong and needs

**1.3 Preparing work area**

Before using any tools or equipment, ensure that the work area is properly prepared. Clear any clutter or obstacles that may interfere with the safe and efficient use of the tools. This will help prevent accidents and ensure that the tools can be used effectively

- Identify the scope of work: Clearly define the scope of work for each task, including the specific activities and deliverables involved. This will help ensure that all necessary tasks are identified and accounted for in the planning process.
- Determine dependencies: Identify any dependencies between tasks, such as tasks that need to be completed before others can begin. This will help establish the order in which tasks should be sequenced.
- Estimate task durations: Estimate the amount of time required to complete each task. This will help determine the overall timeline for the project and identify any potential scheduling conflicts or bottlenecks.
- Allocate resources: Determine the resources needed for each task, including personnel, equipment, and materials. Ensure that resources are allocated appropriately to avoid delays or resource constraints.

- Develop a schedule: Create a detailed schedule that outlines the start and end dates for each task, taking into account task dependencies, estimated durations, and resource availability. This will provide a roadmap for executing the project and help manage expectations.
- Monitor progress: Regularly monitor the progress of tasks to ensure that they are being completed according to the schedule. This can be done through regular communication with personnel, tracking of milestones, and reviewing documentation and records.
- Adjust as necessary: As the project progresses, be prepared to adjust the schedule and sequencing of tasks as needed. This may be necessary due to unforeseen circumstances, changes in priorities, or new information that becomes available.

## Self-check -1

**Part-I: Choose the correct answer**

1 .What hazard do safety goggles protect against?

A. Heat

B. Dust

C. Strong light

2. What rule applies to the use of protective clothing?

A. Replace your clothing once a year.

B. Immediately repair or replace torn/worn clothing.

C. Immediately replaces torn/worn clothing at your own cost.

D. All

3. What does PPE stand for?

A. Personal Protective Equipment

B. Preventive Productivity Enhancement

C. Professional Personnel Evaluation

D. Proactive Production Execution

4. What should you do if you receive an electric shock?

A. Touch the person next to you

B. Apply ointment to the affected area

C. Call for medical help immediately

D. Ignore it and continue working

**Part-II: Say true for right statement and false for wrong statement.**

1. The OHS Regulation addresses requirements related to general administrative matters and health and safety rules and regulations.
2. You must set up safe-work practices at your site.
3. The OHS Act states that you, as an employer, must not do everything you

## Unit Two:fire installation requirements

1.1 Thisunittoprovideyouthenecessaryinformationregardingthefollowingcontentcoverageandtopics:

- Fire System requirements. .
- Order piping and materials requirement

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify Fire System requirements. .
- Order piping and materials requirement

## 2.1. System requirements

A Fire Suppression System is an essential component of any building's fire safety system. The requirements for these systems are determined by the International Fire Code (IFC), which provides a minimum standard of protection and safety against fire risks.

The core requirement for all Fire Suppression Systems is that they are designed, installed, tested and maintained in accordance with IFC standards. These standards mandate the use of automatic fire suppression systems to help prevent the spread of fires when they are detected. The type of suppression system required will depend on the size and complexity of the building. For example, larger buildings may require a sprinkler system while smaller ones may only need smoke detectors and hand-held fire extinguishers.

- Hydrant wrench is a tool used to remove fire hydrant caps and open the valve of the hydrant.
- Heavy-duty adjustable fire hydrant wrench with an overall length of inches. Spanner for pin lug and rocker lug couplings, 1 1/2" thru 6". Notched to fit 1 1/4" square hydrant nut for pentagon hydrant nuts up to 1 1/2" from point to flat plated iron head, 7/8" plated steel handle
- Tape Measure this is simple equipment which all the plumbers have. A metallic measuring tape rolled inside a small, compact, plastic case is used to measure the dimensions of plumbing system and components
- Various Screw drivers the screwdrivers are used to screw or unscrew various connections with the help of screws, nails, and nuts. A vast variety of screwdrivers are available with various point sizes and shapes. The most common screwdrivers are the star- and plus-shaped screwdrivers.
- Tube or Pipe Cutters this is a wrench-and-blade setting used to cut metallic or plastic (PEX or PVC) tubes and pipes. The head of this tool is generally adjustable according to the width of the tube or pipe.
- Teflon Tape this is a type of tape, generally white in color, used to secure the connections. The tape is wound on the threads of pipes, valves, faucets, showerheads, and other plumbing systems to make the connections tight and leak-proof.

- Plungers these are the vacuum creating tools used to unclog drains, sinks, toilets, and bathtubs. These have a rubber cup attached to a wooden or metallic rod (handle). The rubber cup creates a vacuum and sucks out the clogging debris and materials.
- Faucet Wrenches the major function of these wrenches is to hold the faucets firmly and turn them in the clock or anti-clockwise direction. These wrenches have one fixed and one adjustable jaw to hold faucets of different sizes.
- Washers these are simple round, flat, disks with a hole at the center that sits inside the faucets and showerheads. The rubber, plastic, or metallic washers are used to control the intense flow of water through the faucets and showerheads.
- Drill and Hole-Making Tool this is electric equipment attached with an auger or a hole-saw that creates holes for differently sized plumbing pipes and systems. These tools and
- equipment are widely used by professional plumbers for plumbing
- Maintenance, repairs and replacement projects.

## 2.2. Ordering materials requirement

Material requirements planning (MRP) is a system for calculating the materials and components needed to manufacture a product. It consists of three primary steps: taking inventory of the materials and components on hand, identifying which additional ones are needed and then scheduling their production or purchase.

MRP, which is done primarily through specialized software, helps ensure that the right inventory is available for the production process exactly when it is needed and at the lowest possible cost. As such, MRP improves the efficiency, flexibility and profitability of manufacturing operations. It can make factory workers more productive, improve product quality and minimize material and labor costs. MRP also helps manufacturers respond more quickly to increased demand for their products and avoid production delays and inventory stock outs that can result in lost customers, which in turn contributes to revenue growth and stability.

MRP is widely used by manufacturers and has undeniably been one of the key enablers in the growth and wide availability of affordable consumer goods and, consequently, has raised the standard of living in most countries. Without a way to automate the complex calculations and data management of MRP processes, it is unlikely that individual manufacturers could have scaled up operations as rapidly as they have in the half century since MRP software arrived.

A pipe is a tubular section or hollow cylinder, usually but not necessarily of circular cross-section, used mainly to convey substances which can flow—liquids and gases (fluids), slurries, powders and masses of small solids. It can also be used for structural applications; hollow pipe is far stiffer per unit weight than solid members. Pipe is generally specified by a nominal diameter with a constant outside diameter (OD) and a schedule that defines the thickness. Tube is most often specified by the OD and wall thickness, but may be specified by any two of OD, inside diameter (ID), and wall thickness. Pipe is generally manufactured to one of several international and national industrial standards.

Both "pipe" and "tube" imply a level of rigidity and permanence, whereas a hose (or hosepipe) is usually portable and flexible. Pipe assemblies are almost always constructed with the use of fittings such as elbows, tees, and so on, while tube may be formed or bent into custom configurations. For materials that are inflexible, cannot be formed, or where construction is governed by codes or standards, tube assemblies are also constructed with the use of tube fittings.

**Pipes material properties**

Pipe is made out of many types of material including ceramic glass fiberglass,many metals, concrete and plastic. In the past, wood and lead(Latin plumber, from which comes the word 'plumbing') were commonly used.

1. **Metallic piping**

Metallic pipe is made of steel or iron, such as unfinished, black (lacquer) steel ,carbon steel ,steel, galvanized ,brass, and ductile iron. Iron based piping is subject to corrosion if used within a highly oxygenated water stream. Aluminum pipe or tubing may be utilized where iron is incompatible with the service fluid or where weight is a concern; aluminum is also used for heat transfer tubing such as in refrigerant systems.

2. **Galvanized steel pipe** is a type of steel pipe coated with zinc for corrosion reduction. It offers enhanced corrosion resistance and is ideal for applications where it is wetted and dried periodically. However, it can cause errors in requirements and specifications, leading to time wasted and potential accidents. Safety-critical systems must ensure that requirements are specified correctly to generate clear and accurate specifications, as errors can lead to accidents.
3. **Copper tubing** is popular for domestic water (potable) plumbing systems; copper may be used where heat transfer is desirable Copper pipe often is used in both hydraulic and

domestic applications, especially for 2-in. and smaller pipe sizes. However, some contractors propose replacing galvanized steel domestic-water pipe with copper up to 6-in. in size, especially in the Midwest. Copper is an expensive material but has the advantage of weighing less than steel and may require fewer employees to install, depending on weight and union restrictions. Also, Copper is generally more noble and corrosion-resistant than steel or galvanized steel.

4. **Cast iron pipe** means a pipe or conduit used as a pressure pipe for transmission of water, gas, or sewage or as a water drainage pipe. It comprises predominantly a gray cast iron tube historically used uncoated, with newer types having various coatings and linings to reduce corrosion and improve hydraulics.

**It has very good corrosion resistance in these applications.**

- The disadvantage is that the most common joints are not restrained.
- Most cast iron joints are either push-on or no-hub.
- Push-on joints work very well underground where the soil pressure helps stop the pipe from moving. Above ground, however,

There are risks that the pipe may separate if there is a blockage and the pressure becomes too high. Galvanized steel, primarily for storm systems, with mechanical couplings or plastic-bonded piping can be specified when a risk of flooding due to pressure seems possible.

Ductile iron (DI)is like cast iron, except that it has a lower percentage of carbon and has annealing and/or additives, such as magnesium, to form a different (nodular) matrix. This makes it stronger and more ductile than cast iron.

Its corrosion resistance is very similar to cast iron. DI is commonly used for city water mains. For storm or sanitary sewers, one length of DI pipe passing under footings can be specified so that, if the structure settles, the pipe will bend and not break.

5. **Lead piping** is still found in old domestic and other water distribution systems, but is no longer permitted for new potable water piping installations due to its toxicity. Many building codes now require that lead piping in residential or institutional installations be replaced with non-toxic piping or that the tubes' interiors be treated with phosphoric acid
6. **Steel pipes** are made with metal alloys of iron and other metal like aluminum/ manganese etc. and has greater strength and durability than iron pipes. They are either seamless or welded along the length of the pipe and galvanized by coating it with a layer of zinc in a hot

zinc bath or by an electroplating process. Zinc is non-toxic to humans and hence is an ideal metal for coating water pipes.

**Pipe sizes**

Pipe sizes can be confusing because the terminology may relate to historical dimensions. For example, a half-inch iron pipe does not have any dimension that is a half inch. Initially, a half inch pipe did have an inner diameter of1⁄2inch (13mm)—but it also had thick walls. Pipe sizes are specified by a number of national and international standards.

There are two common methods for designating pipe outside diameter (OD).The North American method is called NPS ("Nominal Pipe Size") and is based on inches (also frequently referred to as NB ("Nominal Bore")). The European version is called DN ("Diameter Nominal" / "Nominal Diameter") and is based on millimeters. Designating the outside diameter allows pipes of the same size to be fit together no matter what the wall thickness.

**Jointing methods of pipe**

Threading involves screwing the pipes together, usually with a female nipple between two male-threaded sections of pipe. Threading is common for steel and galvanized steel pipes. It is also common for some plastic pipe materials. It is used for SS but requires fresh dies and an anaerobic pipe compound to make leak-tight joints. Threaded joints withstand forces in all directions.

**Mechanical couplings** with stand forces in all directions and can also hold any desired pressure. Today we see a movement toward either shop-welded assemblies that are connected in the field by mechanical couplings or systems that are fully mechanically coupled, primarily in sizes above in. Both rigid and flexible couplings are available. Some projects also include vertical risers that benefit from the linear flexibility of “flexible” couplings to avoid expansion joints or offsets that increase shaft sizes to prevent pipes from breaking due to shear forces at inflexible shaft walls. Flexible mechanical couplings also can replace flexible connections, depending on the geometry and vibration isolation of the pump or equipment.

**Flange type** is another type of conventional mechanical jointing. A HDPE Flange adaptor (Stub end) is butt welded to the pipe with the loose steel backing flange inserted inside.

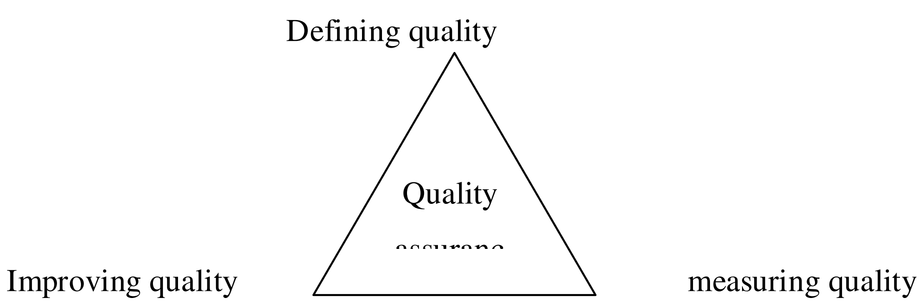
A standard number of bolts will be fitted to tighten the connection. This type of connection is practical for application which requires easy serviceability in the future. Flanging is expensive but virtually foolproof. Flanged joints can hold any desired pressure and can be dielectric to minimize corrosion.

Welding is an old and reliable technology. It basically involves melting the pipes together. Steel and polypropylene employ this method. Welding can be used for galvanized steel, but it is virtually impossible to repair the zinc coating on the interior of the pipes, so mechanical coupling is preferred.

**Electro fusion welding**: This is an easy system for jointing pipes and fittings installed resistance wires are embedded in the inside surface of the electro fusion coupling. When the pipes or fittings are inserted in the coupling and the wires are connected to the welding unit, the contact surfaces become warm and consequently melt into each other until it forms a rigid and durable joint. A welding unit is available for this procedure which operates the timing automatically. This makes the whole operation very easy and practical especially in narrow and tight installations

**Quality assurance**

The Quality Assurance (QA) approach to addressing quality of care issues incorporates three core quality assurance functions: defining quality, measuring quality, and improving quality(QAP/URC, 2001a.) The QA triangle effectively illustrates the synergy between these three QA functions.




Each core function actually represents a constellation of activities, as explained below. The triangle shape indicates that rather than a unique sequence of steps that initiate QA activities, all core functions need to take place in a balanced manner for a QA strategy to be effective.

The greatest impact on quality of care results only when all three functions are implemented in a coordinated fashion. In this database, the focus is on issues relevant to the measurement of quality.

**Defining Quality**

Defining Quality means developing expectations or standards of quality. Standards can be developed for inputs, processes, or outcomes (expected outputs, results or impact on health status); they can be clinical or administrative. Standards state the expected level of performance for an individual, a facility, or an entire health care system. A good standard is reliable, realistic, valid, clear, and measurable. Standards of quality can be developed for each of the nine dimensions of quality shown below, which cover widely recognized attributes of quality of care.

**Improving Quality**

Usesquality improvement methods (problem solving, process re/design or re-engineering) to close the gap between the current and the expected level of quality (defined by the standards). This core function applies quality management tools and principles to:

- identify/determine what one wants to improve;
- analyse the system of care/problem;
- develop a hypothesis on which changes (solutions) might improve quality;
- test/implement the changes to see if they really yield improvement; and
- Based on the results of testing, decide whether to abandon, modify, or implement the solutions (QAP/URC, 2001b).

**Measuring Quality**

Consists of quantifying the current level of performance or compliance with expected standards. This process requires identifying indicators of performance, collecting data, and analysing information. Measuring quality is inextricably linked with defining quality because the indicators for measuring quality are related to the specific definition or standard of quality under study. When standards define quality, measuring quality requires assessing the level of compliance with standards. Hence, measuring quality is easier with a clear definition or standard, because the indicators are directly derived from the expression of the standards. Likewise, measuring quality leads directly to identifying areas for improvement or enhancement.

- If one starts the QA approach with measuring quality, the scope of measurement should be limited to what the system is able/willing to improve (i.e., a quality improvement objective must be defined).
- The QA team must be realistic about what data the team can readily collect at the facility level or across the system. A simple performance monitoring system with a limited number of indicators related to the improvement goal is usually very effective.

- **Measurement strategies,** such as special surveys, self-assessment, audits, and supervision visits, must be carefully designed so that those stakeholders ultimately controlling the quality of care (usually the providers) take full ownership of the quality improvement process. The team in charge of making improvements should fully participate in defining standards, identifying indicators, and developing a measurement strategy.

The indicators used to measure quality will vary in each setting, based on the particular standards used and the level of the system (facility, district, regional, or national) on which measurement focuses. With regard to maternal health, indicators are based on existing Neonatal and Emergency Obstetrical Care (EMOC) standards relating to new-borns and safe motherhood. However, even when well-defined national standards exist, defining new standards (and indicators) specific to the needs of the facility and community served may be necessary.

### 2.2.1 Checking below ground piping and materials

Piping systems are prevalent throughout our everyday world. Most of us think of piping systems as underground structures used to convey liquids of one sort or another. To the novice, the concept of pipeline installation underground sounds relatively straight forward: a) dig a trench b) lay the pipe in the trench, and c) fill the trench back in.

Here water supply tools and equipment are necessary for cleaning, measuring, cutting, reaming, fitting, installing and repairing of the water supply system including the fire hydrants and hose real systems. Therefore in order to complete the installation of fire hydrants and hose real

System the tools, Equipment and materials are checked maintained and stored according to manufacturer guidelines and organizational requirements regularly.

## Self-check 2

**Part-I: Choose the correct answer**

1. Tools and equipment used to install/replace water meter checked and maintained based on____?

A. Manufacturer guide line

B. Rules and regulations

C. organizational requirements

D. A & B

2. _____is finding out whether the tools and equipment used for installing/replacing the water meter are correct, functional and not damaged or not.

A .Checking	C storing

B maintaining	D. all

3. The term inspection, testing, measurement, replacement and adjustment can be represented_____?

A. Check	C. store

B. maintenance	D. all

4. _____is planned and focuses on preventing future problems?

A. A Corrective maintenance	C. Emergency

B. Routine maintenance	D. all

5. Putting the water meter installing/replacing tools and equipment away and keep them until you need them again is _______

A. Restoring site	B. Checking Equipment

C. Storing Equipment D. all

## Operation sheet-1

**Operation title:** Ordering fire hydrant materials

**Purpose:** To guide the process of ordering fire hydrant materials

**Equipment Tools and Materials:**

- Computer or mobile device with internet access
- Supplier contact information
- Product catalogs or specifications
- Notepad or electronic device for note-taking

**Steps in doing the task:**

1. Assess Project Requirements:
   a. Review the project plans, specifications, and any relevant documentation to determine the specific fire hydrant materials needed.
   b. Identify the required quantities, types, and specifications of fire hydrants, fittings, valves, and associated components.
2. Research Suppliers:
   a. Identify potential suppliers of fire hydrant materials.
   b. Conduct online research and consult industry directories.
3. Contact Suppliers:
   a. Use the gathered contact information to reach out to the selected suppliers.
   b. Initiate communication via phone, email, or online inquiry forms to inquire about the availability of the required materials.
   c. Provide precise details about the desired materials, including quantities, specifications, and any specific project requirements.

4. Request Quotations:
   a. Request detailed quotations from the suppliers for the identified fire hydrant materials.
   b. Clearly communicate the required quantities, specifications, delivery location, and any additional terms or conditions.
   c. Request the suppliers to include pricing, lead time, payment terms, and any applicable discounts or promotions.
5. Evaluate Quotations:
   a. Review the received quotations from different suppliers.
   b. Compare the prices, availability, lead times, and other factors to determine the most suitable supplier.
   c. Consider the supplier's reputation, quality of materials, after-sales support, and any relevant customer reviews or references.
6. Confirm Order:
   a. Select the preferred supplier based on the evaluation.
   b. Contact the chosen supplier to confirm the order.
   c. Provide the necessary details, including the accepted quotation, delivery address, billing information, and any specific instructions or requirements.
7. Document the Order:
   a. Maintain a record of the confirmed order, including the supplier's details, quotation, and any communication for future reference.
   b. Document the agreed-upon delivery schedule and any terms or conditions discussed.
8. Arrange Payment:
   a. Coordinate with your organization's finance department or responsible personnel to arrange payment for the ordered materials.
   b. Follow any established payment procedures or guidelines.
9. Follow-up and Tracking:
   a. Maintain regular communication with the supplier to track the progress of the order.
   b. Request updates on the order status, including production, shipping, or any potential delays.
   c. Address any concerns or issues promptly to ensure a smooth procurement process.
10. Receipt and Inspection:
    a. Upon delivery, inspect the received fire hydrant materials for any visible damage,

discrepancies, or defects.

b. Compare the delivered materials with the order details to ensure accuracy and completeness.

c. Document any discrepancies or issues and notify the supplier accordingly.

**Quality Criteria:** Assured performing of all the activities according to the procedures. **Precautions:** Use proper safety requirement.

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## Lap Test-1

***Instructions***: Perform the following activity as required standard

**Task 1:** Collect necessary material and equipment for your work.

**Task 2:** Order necessary material for firefighting system installation

**Task 3:** Finalize your work

## Unit Three: Install and test fire hydrant hose reel system

Thisunittoprovideyouthenecessaryinformationregardingthefollowingcontentcoverageandtopics:

- Design drawings
- Install fire hydrant and hose reel system
- Test pipes pressure

Thisguidewillalsoassistyoutoattainthelearningoutcomesstatedinthecoverpage.Specifically,upon completion of this learning guide, you will be able to:

- Installing with the given drawing
- Install fire hydrant and hose reel system
- Test pipes pressure

### 3.1 Read and interpreting drawing

Design drawings for construction contain all the information necessary for the construction contractor to bid on and build a particular project. Typically, the preparation of design drawings provides a detailed record of the design and structural requirements of the works. A contract or tender document often references design drawings. Design drawings should show details on layout, measurements, plan, cross-sectional and vertical profiles. This information is prepared as scale drawings of the works to be constructed.

**Design drawings should be presented in such a way that**

- The project can easily be understood
- They visually communicate the concept to the lot feeder and the construction contractor
- They are legible
- They include all information from previous revisions and updates.

**Design drawings should include the following aspects**

- Site layout and the location of the works to be constructed
- Plan views.
- Detailed designs and cross-sectional profiles of the works.
- Dimensions and units gradients.
- Titles and scales that meet the required standards and units.
- •Adequate labeling.

**Designing** a fire hydrant system requires careful consideration of several critical criteria. The water supply, building size and layout, fire hazard classification, fire hydrant type, and system maintenance must all be considered to ensure that the system is effective in protecting the building and its occupants.

#### 3.1.2 Setting out pipe work.

Setting out pipe work refers to the process of determining the exact location and layout of pipes for plumbing or irrigation systems. This is typically done before any installation work begins to ensure that the pipes are correctly positioned and aligned.

**Design and planning**: The first step is to create a design for the pipe system, taking into consideration factors such as water flow, pressure requirements, and the layout of the building or area. This design will serve as a guide for setting out the pipes.

**Marking reference points**: Using the design as a reference, the installer will mark out the positions of key reference points on the ground or walls. These points may include where the pipes will enter or exit the building, connection points, and any changes in direction or elevation.

**Measuring and marking pipe positions**: Using measuring tools such as a tape measure or laser level, the installer will measure and mark the exact positions where the pipes will be installed. This includes marking the centerline of the pipes and any fittings or joints.

**Aligning pipe routes**: The installer will use string lines or chalk lines to connect the marked points and create a clear path for the pipes. This helps ensure that the pipes are properly aligned and follow the desired route.

**Digging trenches**: Once the pipe positions are marked and aligned, the installer will dig trenches along the marked route. The depth and width of the trenches will depend on the size and type of pipes being installed.

**Installing pipes:** With the trenches prepared, the installer will lay the pipes in the correct position, following the marked centerline. They will ensure that the pipes are properly supported and secured to prevent movement or damage.

**Connecting fittings and joints**: As the pipes are installed, the installer will connect fittings, valves, and joints as required by the design. They will ensure that these connections are tight and leak-free.

**Testing and inspection**: Once the pipe work is complete, the installer will conduct tests to check for any leaks or issues. This may involve pressurizing the system or running water through the pipes. Inspections may also be carried out by relevant authorities or building inspectors.

### 3.1.3 Materials to install fire hydrant

**Ductile iron pipe** refers to a type of carbon-iron alloy that is easily molten and cast into any desired shape due to its 2% carbon content.

**Flexible couplings**: also known as a split-type expansion joint, is a kind of pipeline connection (also named flexible couplings for pipes), has reliable performance, and is easy to install

**Butterfly valves** are a family of quarter-turn rotational motion valves that are used in pipelines to shut-off flow. It is often said that butterfly valves can be used to regulate the flow. However, we do not recommend doing this, as it can damage the valve disk and have a negative effect on the sealing properties. They are used in a wide variety of process media and industries especially in water supply, collection, and distribution, as well as pumping stations, and have a broad range of use cases especially in flow isolation. A couple of their key advantages over other valve families are their simple construction and compactness, resulting in the end products being of lighter weights and lower cost and with smaller installation footprints and faster actuation speeds **air valves**: Air valve assemblies shall be as shown on Standard Detail SD-226 and shall conform to AWWA C512. Air valves shall be one (1) inch in size, of the Specifications For Water Mains and Fire Hydrants July 2006-R1 Page 15 of 37 combination type, with

**Grooved fittings**: Grooved fittings are used for connecting Standpipe to control, distribute, or support pipeline in different sizes or directions. By groove connection, project time is saved a lot with fast installation and easy maintenance. TPMC supply grooved pipe fittings for firefighting system

- Grooved elbow
- Grooved cross
- Grooved cap
- Grooved tee
- Grooved reducer

Hose reel systems riser diagram

- The type of rising main system shall be provided appropriate to the building as follows:
- dry rising main shall be installed in buildings where the habitable height is more than 10m, but does not exceed 60 m,
- Wet rising main shall be installed in buildings with habitable height exceeding 60 m.
- Separate dry and wet rising mains systems in buildings are permitted.

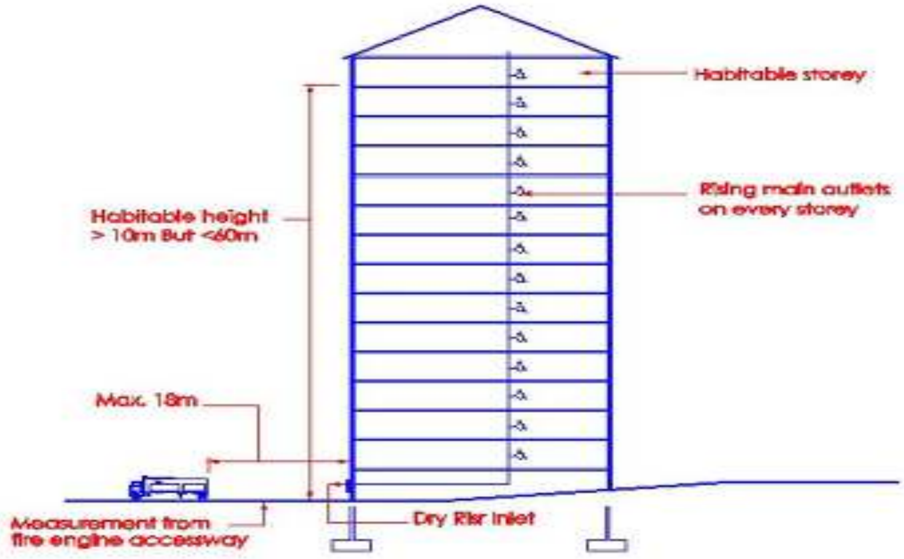


Figure 3.1Firefighting Riser diagram

### 3.2. Install fire hydrant and hose reel system

Fire hydrant: - In a building, a fire hydrant system is a safety measure or emergency equipment required in some buildings that comprises a series of components that when assembled together provide a source of water to assist fire authorities in a fire

It is designed to provide rapid access to water if a fire breaks out. Fire hydrant installation consists of a system of pipe work connected directly to the water supply main to provide water to every hydrant outlet and is intended to provide water for the firemen to fight a fire.

**Figure 3.2 Fire Hydrant**

**Fire Hydrant Working**

Many sites have different types of fire hydrant systems with a variety of valves and connecting points. Firefighters find fire hydrants, attach their hoses, and then pump a massive amount of pressurized water to extinguish the fire. The hydrant's valve cover is removed using a specific pentagonal wrench. The firefighters then open the valve to allow the water to flow after attaching the hoses.

They normally have a nut or bolt to turn on to start the flow and a connecting point to connect a fire hose to. Every fire hydrant is nothing more than a connection to the main water line. A riser pipe links the hydrant valve to the ground underneath it. Normal hydrants, on the other hand, do not affect the water pressure or flow. They act as valves, allowing firemen to use the existing pressure in the water lines. While all of this may appear to be straightforward, the underlying mechanics of a fire hydrant are more complicated and vary by area.

Fire hydrant installation consists of a system of pipe work connected directly to the water supply main to provide water to each and every hydrant outlet and is intended to provide water for the firemen to fight a fire. The water is discharged into the fire engine form which it is then pumped and sprayed over fire. Where the water supply is not reliable or inadequate, hydrant pumps should be provided to pressurize the fire mains.

### 3.2.6 Material of firefighting system

**Firefighting pipes** are often made of durable carbon steel and are painted red, so that they can be easily identified. However, these are not the only types of firefighting pipes that are available. There are also light-wall types that are galvanized and may be silvery on the exterior

**Cast iron** is non-combustible, making it ideal for installation where drainage pipework has to penetrate a wall or floor in fire compartment. Cast Iron has the added benefit of requiring simple, low-cost fire-stopping in the annular space between the pipe and structure

.

**Figure 3.3 Cast iron**

**Cast iron**

**Copper piping** is a tube-like material made from copper, a red-brown metal with the chemical symbol Cu and atomic number

**Figure 3.4 Copper piping**

**Copper piping**

**Galvanized pipes** are steel pipes that have been dipped in a protective zinc coating to prevent corrosion and rust. Galvanized piping was commonly installed in homes built before.

**Figure 3.5 Galvanized pipe**

**Landing valve** is considered a core part of the hose system that works as a manual stop valve allowing you to completely control your firefighting system. To activate the water flux of the firefighting system, you simply turn the landing valve handle counterclockwise. Water pressure matters for high buildings.

**Figure 3.6 Landing valve**

**hose coupling** is a fire hose fitting that is located on the end of a hose. It couples, or connects, with a hose, tap, or water source, and is typically made of brass, stainless steel, **or** aluminum.

**Figure 3.7Hose coupling**

Fire hydrant installation consists of a system of pipe work connected directly to the water supply main to provide water to every hydrant outlet and is intended to provide water for the firemen to fight a fire. The water is discharged into the fire engine form which it is then pumped and sprayed over fire.

**Figure 3.8Fire hydrant**

**Components of fire hydrant system**

•Water Supply & Storage

•Pipe work & Valves

•Fire Brigade Booster

•Pump set

•Hydrant, Hydrant Valve or Landing Valve & Coupling

•Lay flat Fire Hose

•Block Plan

Fire water storage tanks supply dedicated source of water set to support automatic sprinkler and fire suppression systems.

**Fire water storage tanks:** Pipe fittings are components used to join pipe sections to each other or other fluid control components (e.g., pumps and valves) to construct pipelines. Pipe valves are a type of pipe fitting designed to control the flow of fluid through a pipeline

**Figure 3.9Fire water storage tanks**

**Pipe fittings** are components used to join pipe sections to each other or other fluid control components (e.g., pumps and valves) to construct pipelines. Pipe valves are a type of pipe fitting designed to control the flow of fluid through a pipeline

**Figure 3.10flanged valve**

**Fire brigade connection** means a hose connection at grade or street level for use by the Fire Brigade only for the purposes of supplying water to standpipes or sprinkler systems

**Figure 3.11Fire brigade connecting**

### 3.2.6 Fire pump

Fire pumps are an essential part of many water-based fire protection systems. They are used to increase the pressure (measured in psi and bar) of a water source when that source is not adequate for the system it's supplying.

The Fire Pump Station comprises of the Jockey Pump, Electric Driven Pump and Stand-by Diesel driven Pump. The pump operation is automatic through pressure switch contacts based on header Pressure in the hydrant network. The delivery of the jockey ump and main pump is connected to the common delivery header.

The Fire Hydrant Line is always kept pressurized with water. In the event of any minor pressure drop in the system, the pressure reaches the preset pressure setting for Jockey pump, the Jockey pump will start automatically to compensate the pressure differential. In the event of opening one or more hydrant valve for fighting fire the Jockey pump will not be able to make up this water loss resulting in further pressure drop. When the falling pressure reaches the Preset pressure for main pump, the main pump will start automatically. In case of electric supply failure, stand by diesel engine driven pump will come into operation

**Figure 3.12 fire pump**

### 3.2.7 Fire Hose Reel Installation

Fire hose reels are located to provide a reasonably accessible and controlled supply of water to combat a potential fire risk. They are ideal for large high risk environments such as schools, hotels, factories etc.

**Figure 3.13 fire hose**

**Considerations of fire hose reel system**

- Fire hose reels are not easy to install and it is highly recommend that you use a licensed plumber.
- Installation must be carried out in accordance with AS2441:2005.
- Hose reel placement is covered by the Building Code of Australia (BCA).
- Hose reels should only be connected to a dedicated fire line, not the water mains.
- Should be a minimum of 100 mm clearance around all points of hose drum.
- Valve height should be between 900 mm & 1100 mm from floor level.
- Valve must incorporate an interlock for nozzle.
- Centre of hub should be between 1400 mm & 2400 mm from floor level.

**Flow rate should be a minimum of**:

- 19.8 liters per minute for 19 mm hoses.
- 24.6 liters per minute for 25 mm hoses

### 3.2.8 Fire Fighting Equipment

Firefighting systems and equipment vary depending on the age, size, use and type of building construction. A building may contain some or all of the following features:

- fire extinguishers
- fire hose reels
- fire hydrant systems
- Automatic sprinkler systems

Parts of fire Hose Reel

- Brass Jet and Spray Fire Hose Reel Nozzle. ...
- Brass Jet Fire Hose Reel Nozzle. ...
- Brass Lever Operated Jet Fire Hose Reel Nozzle. ...
- Figure 8 Hose Retainer - Fire Hose Reel. ...
- Fire Hose Retainer / Guide - Bolt On. ...
- Hose Clamp - Fire Hose Reel – 19 mm

Suction fire hose is a specific type of fire hose used in drafting operations, when a fire engine uses a vacuum to draw water from a portable water tank, pool, or other static water source.

**Suction fire hose**

Delivery supply fire hose is a high-pressure hose that carries water or other fire retardant (such as foam) to a fire to extinguish it. Outdoors, it attaches either to a fire engine, fire hydrant, or a portable fire pump. Indoors, it can permanently attach to a building's standpipe or plumbing system

**Figure 3.14 Sanction hose**

Delivery supply fire hose

Fire Hose Boxes are used to store the firefighting equipment like Fire Hoses, Fire Extinguishers, Fire Hose Reels, and Branch Pipes etc. These cabinets provide best protection from the environmental damage to the fire equipment.

**Figure 3.15 Deliverysupply fire hose**

**Fire Hose Boxes** are used to store the firefighting equipment like Fire Hoses, Fire Extinguishers, Fire Hose Reels, and Branch Pipes etc. These cabinets provide best protection from the environmental damage to the fire equipment.

**Figure 3.16 Nozzle**

**A fire nozzle** connects to a fire hose to deliver water or firefighting foam to extinguish a fire. At Fire Product Search we care about your fire station's or fire department's fir fighting equipment and its ability to respond at short notice to the hazardous situations when firefighting.

**FIRE BOX** is a container used in residential homes, offices, factories, and manufacturing warehouses to store basic firefighting equipment. It is crucial for early fire control and prevents larger accidents. Fireboxes can contain hose, nozzle, pulley, valve, and coupling, and may contain flaws or incorrect assumptions. Safety-critical systems require accurate specifications to avoid errors and ensure safety.

**Figure 3.17 Fire box**

### 3.2.9 Installing pipe supports and fixings

**Pipe supports** help shoulder and distribute loads or stresses in a piping system. These systems are especially important for mitigating abnormal conditions, such as load surges, rapid temperature changes, and structural shifting or settling.

**Rigid supports** are used to restrict pipe movement in certain direction(s) without any or limited flexibility in that direction.

**Rest or Sliding Support** In this type of support arrangement, pipe is fixed with reference to vertical downward direction. Movement in downward vertical direction, mainly due to the weight of pipe and containing fluid, is not allowed. This support is sometimes also referred as sliding support.

Guide In this type of support arrangement, pipe is fixed with reference of directions other then the direction in which weight of pipe and containing fluid is acting. Limited flexibility can be provided with the provision of guide gap (gap between pipe outer surface and guide plate inner surface).

Both Rest & Guide In this type of support arrangement, pipe is fixed with reference to vertical downward direction along-with any or all the guide directions..

**Figure 3.18 Pipe support**

### 3.3 Maintenance of installation

All firefighting equipment and components must be properly maintained so that workers are not endangered. Construction regulations require inspections of firefighting equipment and components before and after use.

Preventive maintenance is the systematic care and protection of tools, equipment, machines and vehicles in order to keep them in a safe, usable condition limit downtime and extend productivity. We must always be aware that maintenance tasks themselves are potentially hazardous and can result in injury.

**The successful maintenance program is:**

- Well organized and scheduled,
- controls hazards,
- defines operational procedures, and
- Trains key personnel.

Most manufacturers can provide maintenance schedules for their equipment. Large companies with a fleet of vehicles/equipment typically have a comprehensive maintenance program due to the capital investment and/or leasing agreements. Smaller companies may lease equipment and maintenance services may be included in the leasing agreement.

### 3.3.1 Maintenance requirements of fire equipment

- Obtaining a copy of the maintenance schedule recommended by the manufacturer.
- Ensuring that maintenance is performed as required.
- Ensuring that the person(s) performing the maintenance are competent (e.g. licensed mechanic).
- Retaining records of maintenance/service conducted.
- Specifying who is responsible for overseeing equipment maintenance and where the records are kept.
- Set up a system for removal and tagging of damaged or defective tools and equipment.

**Preventive Maintenance**

- routine cleaning
- adjustment,
- replacement of equipment parts
- Equipment Management Benefits
- Performance high level
- Lowers repair costs

**Lengthens lifespan**

- ✓ Inspect tools for any damage prior to each use.
- ✓ Check the handle and body casing of the tool for cracks or other damage.
- ✓ If the tool has auxiliary or double handles, check to see that they installed securely.
- ✓ Inspect cords for defects: check the power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.

**Fire hydrant pressure tests** are carried out by city officials and professional contractors; a city typically tests its distribution system every five years. They follow guidelines set by the National Fire Protection Association's NFPA 291: Recommended Practice for Water Flow Testing and Marking of Hydrants when gathering data.

Testers often then mark the fire hydrants using a color coding system specified in section 5.1 of NFPA 291 (2022 edition) when they're finished. The color system is an efficient way to notify fire departments of the water supply's strength, and hydrants are categorized according to the GPM of their flow, as illustrated below:

Light blue: anA hydrant with 1,500 GPM or more; considered "Very good flow."

Green: A hydrant with 1,000-1,499 GPM; “Good for residential areas.”

Orange: B hydrant with 500-999 GPM; “Adequate marginally.”

Red: C hydrant with below 500 GPM; “Inadequate.”

### 3.3.2 Check for damaged switches and ones with faulty trigger locks.

Inspect the plug for cracks and for missing, loose or faulty prongs

All Power Tools

Ensure you are properly trained and authorized to safely use the power tool. Always read and Understand the tool’s operator’s manual, tool markings and the instructions packaged with

**The accessory before starting any work**

Ensure you have the correct PPE for the task, some tools require different PPE to others.

- If the power tool has guarding or other safety devices they shall be fitted as per the
- Inspect the power tool for damage and or wear before use.
- Horseplay with any tool is strictly prohibited
- Do not operate power tools in explosive atmospheres, near flammable liquids, gases, or dust.
- Wait for the tool to stop spinning before placing it on the ground or bench
- Always switch off the tool and remove the plug before making adjustments
- Remove adjusting keys and spanners before operating
- Never modify or alter a power tool from its original manufacturers design.
- Never attempt to repair a faulty power tool unless authorized to do so
- Never use a tool that is prohibited from site (check the prohibited items register).Take all damage power tools out of service by attaching a warning tag
- If in doubt stop the task and seek further advice before recommencing.
- Explosive Power Tools are prohibited
- What should you do if you find a tool defective?
- If a tool is defective, remove it from service, and tag it clearly "Out of service for repair".
- Replace damaged equipment immediately - do not use defective tools "temporarily".
- Have tools repaired by a qualified person - do not attempt field repairs

### 3.3.3. Techniques and principles of routine maintenance

Routine maintenance refers to a simple, small-scale activities associated with and general upkeep of a building, equipment, machine, plant, or system against normal wear and tear. It requires only minimal skills or training, but it is done within a specific period of time e.g. daily weekly monthly etc.

### 3.3.4 Purpose of Routine Maintenance

This is to make sure that the system can run effectively.
During the routine maintenance:

- Find hidden problems of the system to optimize them and improve the running efficiency of the system.
- Detect the foreboding of faults and eliminate them in time to avoid rushing reparation and economical loss due to service interruption.
- Fully understand the running status state of the system to give instruction for further development and instruction of the system.

### 3.3.5 Classification of Routing Maintenance

Based on Maintenance Period, Based on different maintenance period, routine maintenance falls into the following types:

a. **Emergency maintenance**: Emergency maintenance refers to the maintenance task in case of equipment fault or network adjustment. You need to perform such maintenance when the user claims fault, or in case of equipment damage or cable failure.
b. **Routine maintenance**: Routine maintenance refers to maintenance items that the operator performs daily so as to learn equipment running status for immediate troubleshooting.
c. **Periodical maintenance**: Periodical routine maintenance refers to regular maintenance. For example, you need not clean a tape recorder or back up data every day. Do them periodically. Periodical maintenance includes monthly maintenance and quarterly maintenance.

**Routine maintenance falls into the following types:**

a. Equipment room environment check
b. Alarm information check
c. Firewall maintenance
d. Operating system maintenance
e. Database maintenance
f. WISG applications maintenance

**Basic Principles of Routine Maintenance**

The basic principles of routine maintenance are as follows: to perform the maintenance must be performed routinely, prepare and carry out the maintenance plan, and record the maintenance items effectively. Detailed maintenance plan and items must be prepared, carried out and recorded effectively during the routine maintenance.

Maintenance of power tools

**Power tools maintenance include the following**

- welding machine
- Cleaning
- Sharpening
- Lubricating
- Repairing
- Tightening
- Testing

Inspection and maintenance of the fire hose cabinets is carried out once a year. The fire hose cabinet is checked with a fully unrolled hose, which is under pressure. If the fire hose has signs of a limiting state, we make rejection with replacement by the new unit

### 3.3.8Test of pipes pressure

Leak testing and pressure testing are often used synonymously. However, pressure testing is a misnomer when referring to leak testing of piping systems. By definition, a pressure test is the procedure performed on a relief valve to test its set-point pressure.

The intent, when pressure testing a relief valve, is not to check for leaks, but to test the pressure set point of the valve by gradually adding pressure to the relief valve until it lifts the valve off of the seat.

A leak test, on the other hand, is performed to check the sealing integrity of a piping system by applying internal pressure to a pre-determined limit, based on design conditions, then checking joints and component seals for leaks. It is not intended that the MAWP (maximum allowable working pressure) of a piping system be verified or validated.

Before discussing the various types of leak tests and leak-test procedures I would like to briefly talk about controlling and tracking this activity. Testing, like many aspects of a project, should be a controlled process. There should be a formal method of documenting and tracking this activity as the contractor proceeds through the leak testing process.

### 3.3.9 Leak-test data forms

The two sets of documents, from those listed above, that need to be retained are the P&ID's and the leak-test data forms. The other two sets of forms are procedural check lists. The leak-test data forms should contain key data such as the following:

- Test circuit number
- Date of test
- Project name or number, or both
- Location within facility
- Line number(s)
- Design pressure
- Test pressure
- Test fluid
- Test fluid temperature
- Time (military) recorded test begins
- Pressure at start of test
- Time (military) recorded test ends
- Pressure at end of test
- Total elapsed time of test
- Pressure test – The equipment is filled with water pressurized and inspected for any leaks to test the integrity of the reel and hose.
- Maximum working pressure usually 12 bar so test pressure is typically 18 bar.

**Types of testing fire hose reel**

- Visual inspection of the hose and all fittings to ensure no defects or leaks.
- Ensuring the hose reel is located in the right place, is unobstructed and displays the correct signage.
- Flow rate test.
- Full pressure test of the hose.

## Self-Check-3

**Part-I: Choose the correct answer.**

1. The main advantage installing or including suction tank in hose real and fire hydrant

A. in order to keep the flow of water in the main

B. to have water when water is off in the main

C. For protection of water when water stagnation

D. A & B

2. Are active fire protection machinery, consisting of water?

A. hydrant system

B. Hose reel system

C. extinguisher

D. fire sprinkler

3. Is used for heated building where here is a risk of the water in the pipe work freezing

A. wet sprinkler system

C. dry or alternative wet dry sprinkler

B. dry sprinkler system

D. all

**Part-II short answer**

1. List is the component of a fire hydrant system
2. Explains the function of fire hydrant system?
3. What is the function of pump?
4. Write the advantage of fire hydrant system?
5. Write the types of fire hydrant system?

## Operation sheet-2

**Operation title:** Fire Hydrant Installation and Testing

**Purpose:** To guide the systematic installation and testing of a fire hydrant.

**Equipment Tools and Materials:**

- Fire hydrant assembly (hydrant, valve, fittings
- Excavation equipment (if required)
- Backfill material (if required)
- Trench shoring or bracing equipment (if required)
- Wrenches (adjustable and pipe wrenches)
- Screwdrivers (flathead and Phillips)
- Pipe cutter
- Pipe threader (if required)
- Teflon tape or pipe sealant
- Gaskets and O-rings
- Lubricants and grease
- Pressure gauge
- Water supply source
- Fire hose and nozzle
- Measuring tape
- Safety equipment (as required by the site)

**Steps in doing the task:**

1. Safety Precautions:

   a. Assess the work area for any potential hazards and implement necessary safety measures.

   b. Ensure the availability and proper use of personal protective equipment (PPE) for all personnel involved in the installation and testing.

   c. Review and adhere to relevant safety guidelines and regulations.
2. Site Preparation:

   a. Identify the optimal location for the fire hydrant installation, considering factors such as accessibility, proximity to the water supply source, and firefighting coverage requirements.

   b. Clear the installation area of any obstructions or debris.

   c. If required, excavate a trench for laying the water supply piping to the fire hydrant location, ensuring proper depth and alignment.
3. Install Water Supply Piping:

   a. Measure and cut the water supply pipe to the required length using a pipe cutter.

b. Thread the pipe ends if necessary, using a pipe threader.

c. Apply Teflon tape or pipe sealant to the threaded connections to ensure a proper seal.

d. Assemble and connect the water supply pipes, fittings, and valves according to the installation plan.

4. Install Fire Hydrant:

a. Position the fire hydrant assembly securely in the designated location.

b. Use wrenches and other necessary tools to tighten the connections and ensure proper alignment.

c. Lubricate the hydrant components as per manufacturer's instructions.

d. Ensure that the hydrant is at the appropriate height and properly secured to the foundation or mounting surface.

5. Connect Fire Hose and Nozzle:

a. Attach the fire hose to the outlet of the fire hydrant using the appropriate fittings.

b. Use wrenches to tighten the connections securely.

c. Ensure that the fire hose and nozzle are in good condition and free from any obstructions or damage.

6. Pressure Testing:

a. Close the hydrant valve and connect a pressure gauge to the hydrant outlet.

b. Gradually open the hydrant valve to allow water flow into the system.

c. Monitor the pressure gauge to ensure that the system is pressurizing properly and there are no leaks or abnormal pressure fluctuations.

d. Conduct a visual inspection of all connections and components for any signs of leakage or damage.

7. Flow Testing:

a. Open the hydrant valve fully to allow the water to flow through the fire hose and nozzle.

b. Measure and record the flow rate and pressure using appropriate equipment.

c. Evaluate the flow rate and pressure against the desired standards or requirements.

d. Verify that the fire hydrant and associated equipment are performing as expected.

8. Backfill and Site Restoration:

a. If excavation was necessary, backfill the trench with the appropriate material and compact it properly.

b. Restore the site to its original condition, removing any excess material or debris.

c. Ensure that the area around the fire hydrant is clear and easily accessible.

9. Documentation and Reporting:

a. Document the completed installation and testing process, including photographs, diagrams, and relevant measurements.

b. Prepare a detailed report or checklist outlining the installation steps, testing results, and any observations or recommendations.

c. Include information about the flow rate, pressure, and any compliance with local regulations or standards.

**Quality Criteria:** Assured performing of all the activities according to the procedures. **Precautions:** Use proper safety requirement.

## Operation sheet-3

**Operation title:** Hose Reel System Installation

**Purpose:** To guide the systematic installation of a hose reel system.

**Equipment Tools and Materials:**

- Hose reel assembly
- Mounting bracket or stand
- Screws, bolts, and anchors
- Drill and appropriate drill bits
- Screwdriver or power drill
- Measuring tape
- Sprit Level
- Wrenches (adjustable and socket wrenches)
- Pipe cutter (if required)
- Pipe fittings and connectors (if required)
- Piping material (if required)
- Hose nozzle
- Fire hose
- Safety equipment (as required by the site)

**Steps in doing the task:**

1. Safety Precautions:

   a. Assess the work area for any potential hazards and implement necessary safety measures.

   b. Ensure the availability and proper use of personal protective equipment (PPE)

   c. Review and adhere to relevant safety guidelines and regulations.

2. Site Assessment:

   a. Determine the optimal location for the hose reel system installation, considering factors such as accessibility, proximity to fire risk areas, and coverage requirements.

   b. Evaluate the structural integrity of the mounting surface to ensure it can support the weight and stress of the hose reel system.

3. Mounting Preparation:

   a. If necessary, mark the location for the mounting bracket or stand based on the site assessment.

   b. Use a measuring tape, level, and appropriate tools to ensure accurate alignment and positioning.

   c. Drill holes for the mounting screws or anchors, following the manufacturer's instructions and local building codes.

4. Mounting the Hose Reel Assembly:

   a. Install the mounting bracket or stand securely to the designated location using screws, bolts, and anchors.

   b. Position the hose reel assembly onto the mounting bracket or stand, aligning it properly.

   c. Use wrenches and other necessary tools to tighten the connections securely.

5. Connecting the Fire Hose:

   a. Attach the fire hose to the outlet of the hose reel assembly using the appropriate fittings.

   b. Use wrenches to tighten the connections securely.

   c. Ensure that the fire hose is in good condition and free from any obstructions or damage.

6. Testing and Inspection:

   a. Open the water supply valve to allow water flow into the hose reel system.

   b. Monitor the system for any leaks or abnormal pressure fluctuations.

   c. Conduct a visual inspection of all connections and components for any signs of leakage, damage, or improper functioning.

   d. Operate the hose reel system to ensure that it can be easily deployed and retracted.

7. Signage and Accessibility:

   a. Install appropriate signage indicating the presence and location of the hose reel system.

   b. Ensure that the hose reel system is easily accessible and unobstructed at all times.

   c. Verify that the hose reel system is within reach of potential fire hazard areas.

8. Documentation and Reporting:

   a. Document the completed installation process, including photographs, diagrams, and relevant measurements.

   b. Prepare a detailed report or checklist outlining the installation steps, testing results, and any observations or recommendations.

   c. Include information about the water pressure, flow rate, and compliance with local regulations or standards.

**Quality Criteria:** Assured performing of all the activities according to the procedures.
**Precautions:** Use proper safety requirement.

## Lap Test: Two

**Instructions:** Perform the following activity as required standard

Task 1: Collect necessary material and equipment for hydrant and hose reel system installation.

Task 2: Perform hydrant installation.

Task 3: Perform hose reel system installation.

Task 4: Perform pressure testing.

Task 5: finalize your work

## Reference book

NFPA website (www.nfpa.org)

Fire engineering (www.fireengineering.com

Fire Safety Search (www.firesafetysearch.com)

Previous handouts & learning guide

•sanitary installation books

•EBCS 9(Ethiopian building code standard 9

•Australian Building Codes Board, 2013, National Construction Code (NCC) Volume 1, Volume and Volume 3.

# TTLM developers profile

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