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HYDROCARBON SECTOR
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Participant Handbook

Sector:
Hydrocarbon

Sub-Sector:
Downstream

Occupation:
Marketing Services

Reference ID: **HYC/Q3701, Version 2.0**
NSQF Level 3

Gas Meter Reader

This book is sponsored by

Hydrocarbon Sector Skill Council

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"Skilling is building a better India. If we have to move India towards development then Skill Development should be our mission."

Shri Narendra Modi
Prime Minister of India

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COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

HYDROCARBON SECTOR SKILL COUNCIL

for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/ Qualification Pack: **'Gas Meter Reader'** QP No. **'HYC/Q3701, NSQF Level 3'**

Date of Issuance: March 4th, 2020

Valid up to*: March 3rd, 2024

*Valid up to the next review date of the Qualification Pack or the 'Valid up to' date mentioned above (whichever is earlier)

Authorised Signatory
Hydrocarbon Sector Skill Council

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The preparation of this manual would not have been possible without the Hydrocarbon Industry's support. Industry feedback has been extremely encouraging from inception to conclusion and it is with their input that we have tried to bridge the skill gaps existing today in the industry.

This participant manual is dedicated to the aspiring youth who desire to achieve special skills which will be a lifelong asset for their future endeavours.

About this book

This Participant Handbook is designed to enable training for the specific Qualification Pack (QP). Each National Occupational (NOS) is covered across Unit/s.

This job is all about capturing gas consumption reading from gas meters installed in consumer's premises for generation of gas consumption bill. The individual is also responsible for physical inspection of the gas meter for any external damage, tampering and similar faults. The person is required to maintain a complete record of each visit to consumer premises and their request or any operational queries. They act as the first level of support staff between consumer and gas distribution companies.

The candidate must have the ability to travel extensively. The person should be well versed with local language.

Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS. The symbols used in this book are described below.

Symbols Used


Key Learning Outcomes


Steps


Exercise


Tips


Notes


Unit Objectives

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It is recommended that all trainings include the appropriate Employability Skills Module Content for the same is available here:

https://www.skillindiadigital.gov.in/content/list

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1. Introduction

Unit 1.1 Introduction to hydrocarbon sector

Key Learning Outcomes

At the end of this Module, the participant will be able to:

1. Identify the market size and government initiatives of the Oil and Gas sector.
2. Describe about Hydrocarbon sector.
3. Recall about oil and gas industry and its sub-sectors.
4. Identify and perform the Roles and Responsibilities of Gas Meter Reader.

Unit 1.1 - Introduction to hydrocarbon sector

Unit Objectives

At the end of this unit, the participant will be able to:

1. Describe about the hydrocarbon sector in India.
2. List the three major segments in the hydrocarbon sector.
3. Identify about the achievements of hydrocarbon sector.
4. Aspects of Gas Meter Reading.

1.1.1 Introduction to training program

This program is built to give the students an in depth knowledge about Gas Meter Reading. The trainee after completing the study material would be able to understand, access and record correct meter readings. This program also covers important precautionary measures that should be taken while the gas meter reader is at work. Before we begin with the roles and responsibility of the gas meter reader, the student must be aware of the important terminologies related to the gas sector.

The training program primarily covers

1. Importance and sources of natural gas, crude oil etc.
2. Program focuses on the functions and properties of natural gas.
3. Recording meter readings.
    - The proper way to record gas meter readings using a hand held device and the available documents.
    - Read and accurately record meter readings and feed the same to the computer system.
4. Working in unsafe conditions.
    - The correct way to access defective meters, if necessary removing the meters (with prior permission of the supervisors).
    - To report any unusual findings, gas leakage or gas theft.
    - Report defects in gas pipelines, etc.
5. Customer Services.
    - Respond under strict deadlines.
    - Provide satisfactory customer service to both residential and commercial customers.
    - Provide suggestions to customers and resolve complaints of customers, refer difficult complaints to immediate supervisor.
6. Working in hazardous conditions.
    - Report unusual or hazardous conditions to supervisor.

- Inspect meters and report any malfunctions and hazardous conditions.

7. The training program would talk about safety procedures for the gas meter reader personnel.

1.1.2 Hydrocarbon sector in India – overview

The Oil and Natural Gas Sector is amongst the 8 core industries driving economic growth in India and plays a crucial role in country's economic growth. The industry is broadly divided into following different segments which refers to different points in the process of exploring and extracting, collecting and processing and ultimately distributing the oil and natural gas for use.

India is expected to be one of the largest contributors to NON-OECD petroleum consumption growth globally. Crude oil import rose sharply to US $ 101.4 Billion in 2019-20 from US $ 70.72 Billion in 2016-17. India retained its spot as the third largest consumer of oil in the world in 2019 with consumption of 5.16 Million barrels per day (MBPD) of oil in 2019 compared to 4.56 MBPD in 2016.

As of October 01, 2020, India's oil refining capacity stood at 249.9 Million metric tonnes (MMT), making it the second-largest refiner in Asia. Private companies own about 35.29% Of the total refining capacity in FY 20.

In FY 20, crude oil production in India stood at 30.5 MMT. In FY 20, crude oil import increased to 4.54 MBPD from 4.53 MBPD in fy19. Natural gas consumption is forecast to reach 143.08 Million tonnes (MT) by 2040. India's LNG import stood at 33.68 BCM during FY 20.

India's consumption of petroleum products grew 4.5% To 213.69 MMT during FY 20 from 213.22 MMT in FY 19. The total value of petroleum products exported from the country increased to US $ 35.8 Billion in FY 20 from US $ 34.9 Billion in fy19. Export of petroleum products from India increased from 60.54 MMT in FY 16 to 65.7 MMT in FY 20.

Gas pipeline infrastructure in the country stood at 17,016 Kms as of June 30, 2020.

India has been the fourth-largest Liquefied Natural Gas (LNG) importer since 2011 after Japan, South Korea, and China.

The Government has adopted several policies to fulfil the increasing demand. It has allowed 100% Foreign Direct Investment (FDI) in many segments of the sector, including natural gas, petroleum products and refineries among others. Today, it attracts both domestic and foreign investment.

1.1.3 Major segments in the hydrocarbon sector

The industry is broadly divided into following different segments which refers to various points in the process of exploring and extracting, collecting and processing and ultimately distributing the oil and natural gas for use.

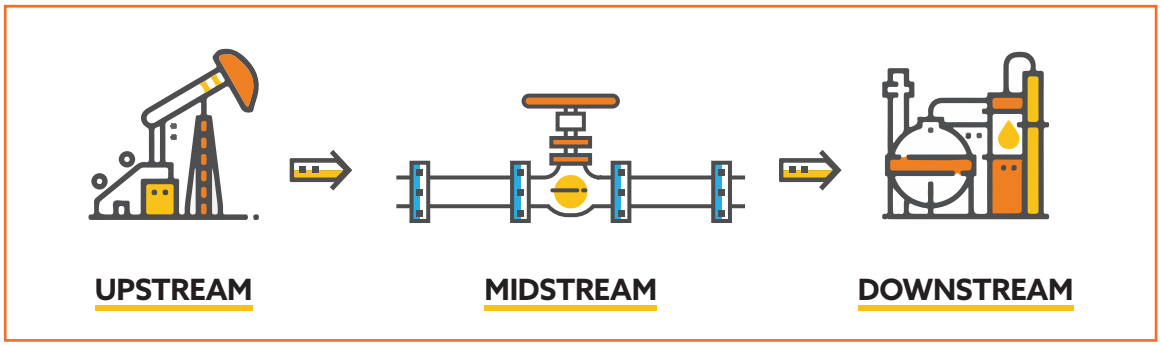

Fig: 1.1.1 Hydrocarbon Segments

The energy sector has three key areas: Upstream, midstream and downstream.

1. **Upstream:** Upstream is E&P (exploration and production). This involves the search for underwater and underground natural gas fields or crude oil fields and the drilling of exploration wells and drilling into established wells to recover oil and gas.

   The term 'upstream' also includes the steps involved in the actual drilling and bringing oil and natural gas resources to the surface, referred to as 'production'.

Fig: 1.1.2 Upstream

1.1.4 Hydrocarbon Sector Skill Council (HSSC)

In line with the National Skill Mission of India, Hydrocarbon Sector Skill Council (HSSC) for the Oil & Gas sector has been set up under the aegis of Ministry of Petroleum & Natural Gas (MoPNG) with its primary objective to execute skill development activities in Indian Hydrocarbon Sector and meeting the entire value chain's requirement of appropriately trained manpower in quantity and quality on a sustained and evolving basis.

Key Objectives:

- To initiate, carry out, execute, implement, aid and assist activities towards skill development in the Indian Hydrocarbon Sector and meeting the entire value chain's requirement of appropriately trained manpower in quantity and quality on a sustained and evolving basis.
- Develop a skill development plan for the sector.
- Identify skill development need of the sector, review international trends and identify sector skill gap and technology.
- Develop National Occupational Standard (NOS's) for the job roles of covering the entire sector/ sub-sector.
- Identification and enlistment of Training Providers as outlined by NSDC.
- Create a pool of skill manpower and creating a benchmark for new skills and up-skilling.

1.1.5 Roles and responsibilities of gas meter reader

The job of a gas meter reader entails the following points.

- To begin with, you should know how to operate a company vehicle to travel in the local region, to visit customers (residential/commercial) who are on the meter reading list.
- You must greet customers at their homes or places of business and if meter is not accessible - from the outside, a meter reading must be scheduled in advance after discussing with the customer.
- You should be well practiced to input data about each customer 's electricity and gas usage into a tablet/ device using database software and details from the location's utility meter.
- You should know how to assess each utility meter during the monthly visit. Also maintaining regular records to ensure the device is working properly and is free of mechanical or electrical defects.
- Gas meter reader should help and assist in providing new electricity and gas activation services to new customers. They should know how to connect the meter to the utility company's network and disconnecting service when required.
- Keep in mind to immediately report inoperable and malfunctioning devices or unauthorized changes to the meter to supervisors when spotted during field checks. If you face an unauthorized usage or tampering of a gas meter immediately report to your senior.
- Organise timely routine maintenance tasks and make small repairs to the utility meter when asked by the customer and the company. Explain the proper functioning to the customers and address all their queries.

- It is importation to maintain a daily log of all details about each work shift, addresses visited, meters read, breaks taken and any other incidents that should be brought into the notice of your superiors to be uploaded into the tablet device.

1.1.6 Aspects of gas meter reading

The Meter readers have to visit each & every consumer's premise in person & record the reading from the Meter in the prescribed format. All the mandatory fields would have to be filled up while visiting consumers premise. The meter reading has to be written by the meter reader in space provided in the format; signature & telephone number of the consumer also has to be taken. The relevant data will have to be updated simultaneously.

The meter readers should be polite & courteous with consumers. They should educate the customers about the gas pipeline and the meter. They should announce and take proper permission before entering the house if the meter is placed within the house. This is important, and if not followed properly can be reported as inappropriate behaviour by the customer , followed by severe actions by the company.

Meter readers will have to be vigilant to visually keep watch on company's property in case of any damage.

Normal meter reading: meter readings to be read from consumers premises as per scheduled time table. In normal meter reading, the consumer's premises is visited once in 2 months by the meter reader to record the actual meter reading.

Specific intimations: specific intimations would mean giving additional information to the gas agency by visible inspection done by the meter reader.

- Gas pipe damaged.
- Meter damaged.
- Glass broken.
- Gas pipe rusted.
- Building demolished.
- Any damage to the agency's property.
- Any other intimation as notified or mutually agreed from time to time.

Attachment/ distribution of circulars with bills attachments of circulars: from time to time prints, various informative brochures, circulars to be sent to consumers. These are attached along with the bills in their respective billing cycles & sent to consumers.

Distribution of circulars: circulars are printed from time to time to be sent to the consumers. Distribution of circulars can either happen while obtaining meter readings of the consumers or as a separate exercise.

Exceptional meter readings: meter readings received but considered doubtful as compared to previous consumption & sent for re-readings to consumer's premises. This also includes all consumers whose meters have not been read the first time also in this list.

The different reasons for exceptions are: high meter reading.

- Negative meter reading.
- Low meter reading.
- Meters not read in first attempt..
- Equal meter reading.

Exercise

Choose one option amongst the following and complete the sentence.

1. "The primary source of Hydrocarbon is ……."

   a) Soil
   b) Petroleum
   c) Liquid
   d) Air

2. "Crude Oil is an important naturally occurring ……."

   a) Fossil Fuels
   b) Solid
   c) Gas
   d) Element

Notes

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2. Carry out gas meter reading activity for bill generation

Unit 2.1 Introduction to natural gas

Unit 2.2 Prepare for visiting the consumer's location

Unit 2.3 Visit consumer's premises to record gas meter reading

HYC/N3701

Key Learning Outcomes

At the end of this Module, the participant will be able to:

1. Explain the basic properties of natural gas.
2. Identify PNG composition and benefits.
3. Describe how to prepare the consumer index list of piped natural gas in accordance with the billing cycle.
4. State the procedure for route planning in the assigned work area.
5. List the tools and equipment required in gas meter reading activity.
6. Identify and record the various types of gas meters.
7. Describe the activities to be undertaken during visit to the consumer's premises.
8. Describe how to verify the consumer's record from companies' database with the meter number.
9. State the possible reasons for abnormal gas consumption reading.
10. Describe how to post an average meter reading for bill generation if the consumer is not available even after the rescheduled visit.
11. Describe how to compile the meter reading data for bill generation.

Unit 2.1 Introduction to natural gas

Unit Objectives

At the end of this unit, the participant will be able to:

1. Identify the types and features of cooking gases.
2. List the points of PNG composition.
3. Explain the city gas distribution in India and its benefits.
4. State the different uses of domestic PNG.
5. Explain the basic properties of flammable gas.
6. Describe how to store the flammable gas.

2.1.1 Types of cooking gases

1. Liquefied petroleum gas (LPG)

Liquefied petroleum gas or liquid petroleum gas (LPG or LP gas), is a mixture of hydrocarbon gases used as a flammable fuel in heating appliances, cooking equipment, and vehicles. LPG is prepared by refining petroleum or **"wet"** natural gas. It is derived entirely from fossil fuel sources, as it is manufactured during the refining of petroleum (crude oil) or extracted from petroleum or natural gas streams as they emerge from the ground.

Fig: 2.1.1 LPG cylinder

- Dr. Walter Snelling first produced LPG in 1910, and the first commercial products started appeared

in 1912. It currently provides about 3% of all energy consumed.

- LPG burns cleaner leaving no soot and very few sulphur emissions.
- As it is in a gaseous state, it does not pose any ground or water pollution hazards, however excessive use can be a reason for air pollution. LPG is considered a pure and clean energy source that provides even and controllable heat. This makes its usage ideal for wide range of industrial uses.
- The boiling point of LPG is below room temperature thereby allowing it to evaporate quickly at normal temperature and pressure and is usually supplied in pressurised steel vessels. The cylinders, etc are typically filled to 80–85% of their capacity to allow thermal expansion of the contained liquid. The pressure at which LPG turns to liquid is known as vapour pressure.
- The downside of LPG is that it is heavier than air, unlike natural gas, and thus flows along floors and tends to settle in lower spots such as basements. This is dangerous in two ways. First- there is a chance of an explosion if the mixture of LPG and air is within explosive limits and there is an ignition source. Second - suffocation due to LPG displacing air, causing a decrease in the oxygen level.

2. Natural gas

Natural gas is a naturally occurring gas mixture obtained from hydrocarbons. The largest component of natural gas is methane, a compound four hydrogen atoms attached to a single carbon atom (CH4). It is a combination of varying amounts of other higher alkanes. Sometimes natural gas might also contain a small percentage of carbon dioxide, nitrogen, hydrogen sulphide, or helium. Natural gas is also known as fossil gas. Just like crude oil, natural gas is formed when several layers of decomposing plants and animal matter are succumbed to intense heat and pressure deep within layers of Earth over millions of years. The energy originally stored in plants is converted in the form of chemical bonds in the gas.

Natural gas similar to crude oil is a non-renewable hydrocarbon used extensively as a source of energy for heating, cooking, and electricity generation. Its by-products are used as a fuel for vehicles.

Natural gas is produced from several types of sedimentary rocks, such as shale formed by forcing water, chemicals, and sand down a well under high pressure. The high pressures release the natural gas from the rock, and allow the natural gas to flow up the wells towards the surface. From there the natural gas is stored and diverted through pipelines and sent to natural gas processing plant.

Natural gas has a negative effect on climate change too- the greenhouse gas effect, which creates carbon dioxide during oxidation. Natural gas can also be used as a replacement for coal to generate electricity, which in return results in the lowering of net carbon dioxide emissions.

Natural gas is the cleanest form of fossil fuels found amongst the available fossil fuels. Natural gas is utilised as a feedstock to manufacture fertilizers, plastics and other commercially important organic chemicals. Chemicals called odorants are added to the natural gas so that leakages in natural gas pipelines can be easily detected. Furthermore natural gas is utilised for electricity generation, heating source for industrial and commercial units. Natural gas is used for cooking in domestic households and a transportation fuel for vehicles.

Biogas

Biogas is a mixture of mainly methane and carbon dioxide produced during the digestion of organic matter, such as animal and kitchen waste as well as crop residues, in the absence of oxygen.

Anaerobic bacteria ferment biodegradable matter into methane (40-70%), carbon dioxide (30 - 60%), hydrogen (0-1%) and hydrogen sulphide (0-3%). The ideal process temperature for the fermentation process is at about 35°C, which might require additional heat or insulation of the digester in regions with daily or seasonal temperature fluctuations.

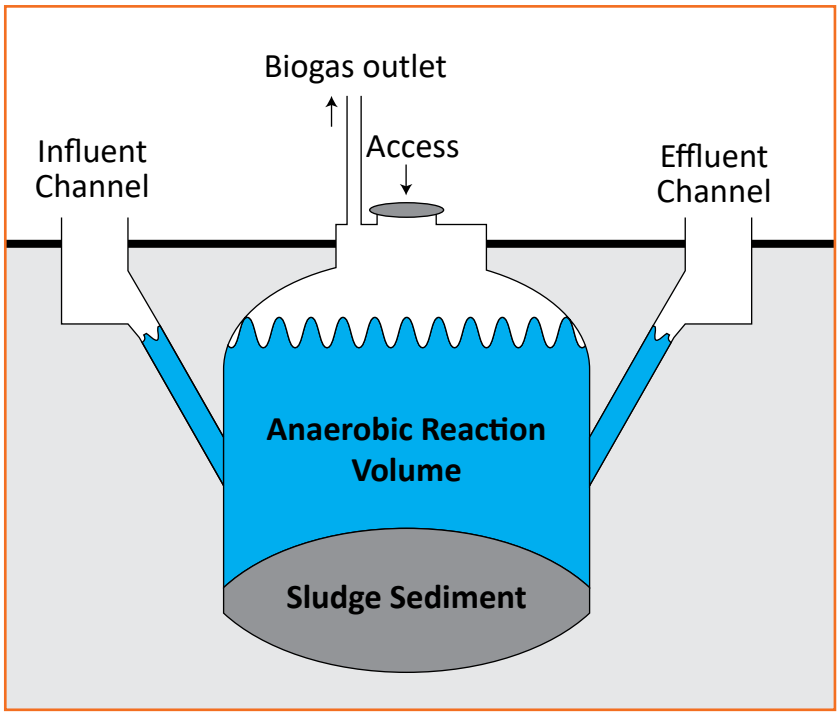

Fig: 2.1.1 Bio gas (diagram)

Biogas production depends on the availability of sufficient biomass feedstock, water and space for the digester. As the biogas cannot be transported over long distances, the digester has to be placed close to the home of its user, which requires sufficient space.

Advantages of Biogas

Biogas burns very cleanly, and produces fewer pollutants during cooking than any other fuel except electricity.	Biogas provides instant heat upon ignition, no pre-heating or waiting time is required.	The by-product (slurry) from the digester can be used as fertilizer.	Biogas is a renewable fuel that is 'carbon negative': unless there are leakages in the system, burning biogas in a cookstove releases less greenhouse gases than if the dung was left on the ground to decompose naturally.

Fig: 2.1.3 Advantages of biogas

2.1.2 Cooking gas features

Fig: 2.1.4 Cooking gas features

2.1.3 Piped natural gas composition

With only one carbon and four hydrogen atoms per molecule (methane) natural gas is a composition of hydrocarbons (almost 95% methane & rest other hydro carbons). Its calorific value generally ranges from 8000 kcal/m3 to 9000 kcal/m3, natural gas has the lowest carbon to hydrogen ratio, and hence it burns completely, making it a more environment friendly fuel.

Physical State	Gas
Colour	Colourless
Odour	Odourless (for easy detection through smell, ethyl mercaptan is added as odourant)
Melting Point	-182 °C
Boiling Point	-161.5 °C

Table 2.1.1 Piped natural gas composition

Benefits of Piped Natural Gas

- **Convenience:** Gas is continuously fed into the system so there are no hassles of refilling / changing

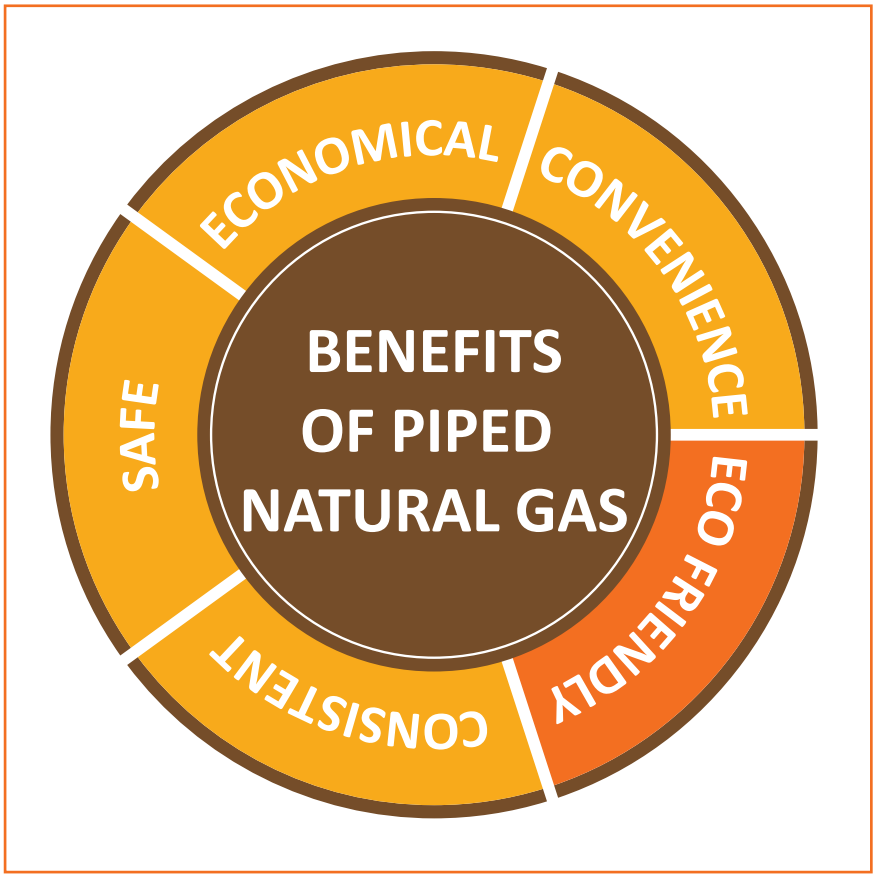

Fig: 2.1.5 Benefits of piped natural gas

the cylinder; it is piped and does not require any space to store, hence handling is easy, safe and secure.

- **Economical:** Is more cost effective in comparison to other conventional fuels for similar uses
- **Safe:** The flammable mixture of natural gas and air does not catch fire if the mixture is leaner than 5% and richer than 15% of the air-fuel ratio required for ignition. This narrow inflammability range makes PNG one of the safest fuels in the world.

  Natural gas (PNG) is lighter than air and, thus in case of a leakage, it disperses easily and avoids spontaneous flammability. It just rises and disperses into thin air given adequate ventilation. But LPG being heavier will settle at the bottom near the floor surface.

- **Consistent, reliable supply:** Since it is supplied through extensive pipeline network, there is hardly any chance of loss of supply or hassle of recharging and refuelling as in case of LPG
- **Customer friendly:** Since, PNG is supplied directly through pipes, thee customer does not have to coordinate with the oil and gas companies on a daily basis for ensuring uninterrupted PNG supply.

  The daily bills, settlements and reconciliation are also avoided as the consumer is billed once a month, and that too as per the meter reading.

- Since PNG is supplied through pipeline, loss due to spillage is avoided
- **Lower maintenance cost:** With PNG, soot or ash accumulation and greasy spillages are absent, Maintenance costs are, thus, driven down

2.1.4 City gas distribution

City gas distribution has enabled the use of natural gas in several sectors such as : domestic/ household, commercial (hotels, hospitals, restaurant and offices), transport (three wheelers, buses, trucks and cars) etc. It is also used by small scale industries for power generation.

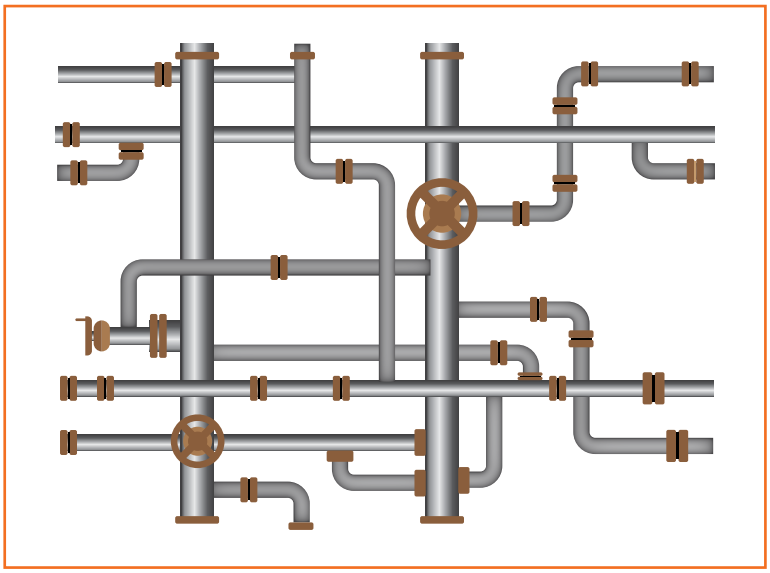

Fig: 2.1.6 City gas distribution

Households in India use natural gas for varied uses such as for cooking, water heating, space heating, air conditioning, refrigeration, power generation and fuelling the vehicle.

Further, the concept of a single switch solution in the Indian domestic sector is on the rise.

Single switch solution helps the households to integrate as gas users to use all gas based services as needed at one go once the gas supply switch is switched on In the commercial sector, city gas is found to be very useful in applications like cooking, air conditioning, power generation.

Benefits of piped natural gas

Fig: 2.1.7 Benefits of piped natural gas

Evolution of city gas distribution in India

- **1857:** Piped Coal Gas Distribution started in Kolkata, Orient Gas Company Ltd. (OGCL) to both industries as well as domestic usage.
- **1950:** Vadodara Mahanagar Seva Sadan (VMSS) developed PNG network for domestic households in the city of Vadodara (Gujrat).
- **1980:** British Gas (BG) Group established Gujrat Gas Company Ltd for developing CGD networks in the city of Surat and Bharuch.
- **1990:** Tripura Natural Gas Corporation Ltd(TNGCL) started PNG network in Agarthala (Tripura). GAIL formulated CGD development work for Delhi and Mumbai respectively. Followed by Kanpur, Pune, Lucknow, Agra, Bareilly, Hyderabad, Indore and Gwalior.
- **2005:** GSPC Gas Co. Ltd, established Gujarat State Govt., worked on the development of CGD network in Hazira (Surat).

2.1.5 Piped natural gas distribution in India

State	City	Company
Delhi	Delhi	IGL
Uttar Pradesh	Noida	
	Greater Noida	
	Ghaziabad	
Maharashtra	Mumbai	MGL
Maharashtra	Thane	MGL
	Mira-Bhayandar	
	Navi Mumbai	
	Pune	
Uttar Pradesh	Kanpur	CUGL
	Bareilly	
	Lucknow	GGL
	Agra	
Gujarat	Vadodara	GAIL
Andhra Pradesh	Vijaywada	BGL
	Hyderabad	
	Rajahmundry	
Tripura	Agartala	TNGCL
Madhya Pradesh	Dewas	GAIL GAS
	Indore	AGL
Haryana	Sonepat	GAIL GAS

Table 2.1.2 Piped natural gas distributors in India

Natural gas used in Different Spheres

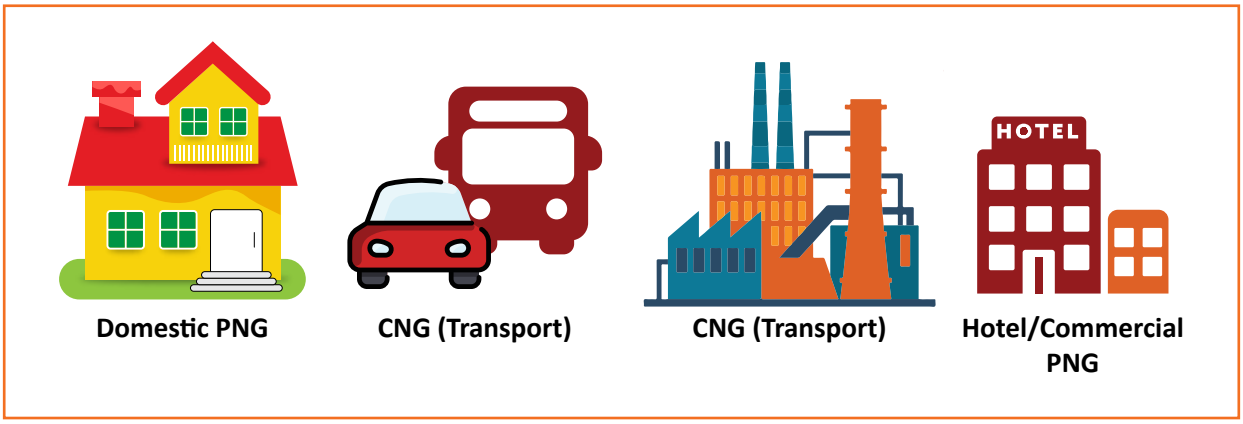

Fig: 2.1.8 Natural gas used in different sector

2.1.6 Different uses of domestic PNG

Domestic PNG is used for various purposes like cooking and water heating, not only by domestic house holds but also by hospitals, nursing homes, hotels, flight kitchens, restaurants, etc. Being efficient, non-polluting and relatively economical, PNG caters to most fuel requirements across sectors.

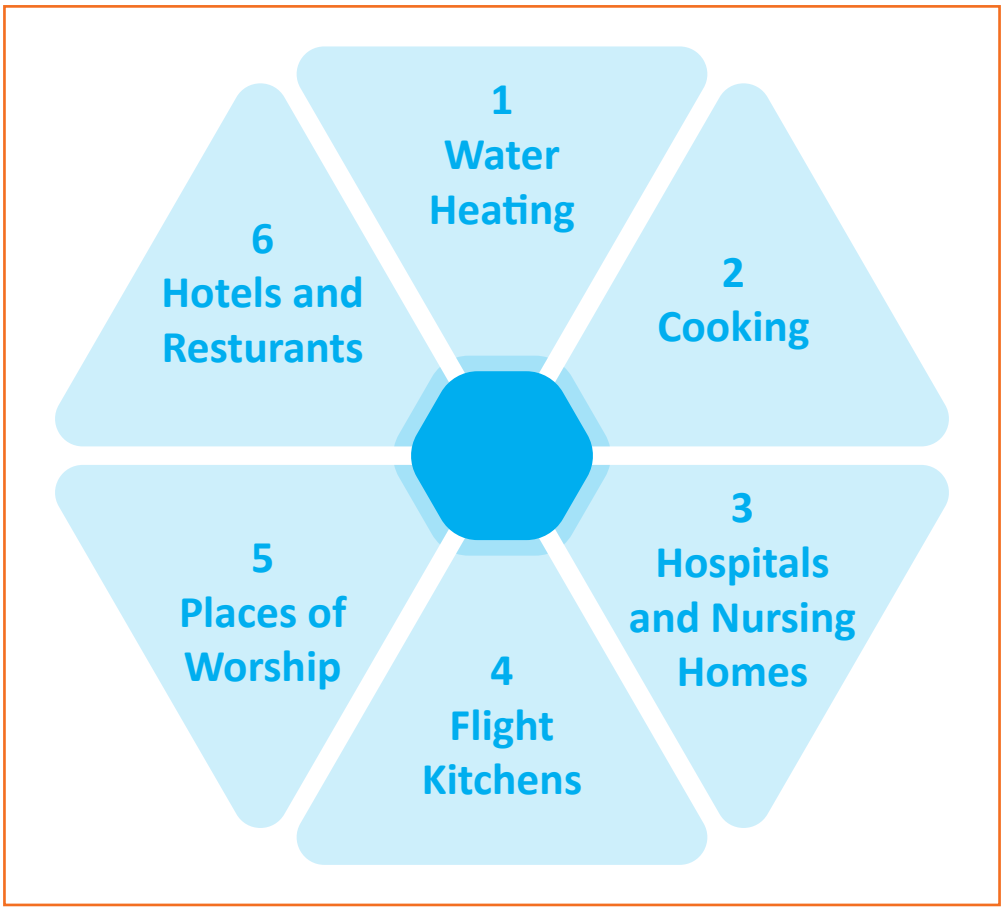

Fig: 2.1.9 Uses of domestic PNG gas

Domestic piped natural gas rate card

Sl No.	Particular	*Charge
1	Flexible Gas Consumption Security Deposit	Rs. 750/- per registration
2	Application Charges	Rs. 750 + 18% GST (9% CGST + 9% SGST) per Registration
3	Refundable Interest Free Security Deposit	Rs. 5000/- per registration (Rs.4500/- at the time of Refundable Interest Free Security deposit registration and balance Rs.500/- to be paid in first bill)
4	Re-Connection Charges (In case PNG Supply is disconnected outside of the customers premise only)	Rs. 4400 + 18% GST (9% CGST + 9% SGST) per connection
5	Permanent Disconnected Charges	Permanent disconnection charges as Rs. 1000/- w.e.f. 01.06.2019 to 31.05.2021 (Contract for carrying out PD Is valid up to 31.05.2021). PD Charges will also include+ 18% GST (9% CGST + 9%5 GST) per connection additionally.
6	Charges for Transfer of Name of PNG Connection	Rs. 350 + 18% GST (9% CGST + 9% SGST) per transfer
7	Cheque Bouncing Charges	Rs. 200 + 18% GST (9% CGST + 9% SGST) per Transaction
8	Shortfall for consumption (Mini mum charges)	At least Rs. 5O+ 18% GST (9% CGST + 9% SGST) per month is charged as shortfall for consumption. (Bills are raised on Bimonthly basis)
9	Delayed Payment Charges	Rs. - 100/-
10	Interest charges on Delayed Payment	An interest of 18% p.a. for the amount unpaid beyond · 0 working days from the due date till the date of settlement of the payment or part thereof. For fresh bill generated, similar process will be followed

Table: 2.1.3 Domestic piped natural gas rate card

2.1.7 Basic properties of flammable gas

Flammability

The capacity of a material to burn is determined by its flammability.

Fig: 2.1.10 Flammable

When flammable gases are combined with air or oxygen in the correct amounts, they become explosive. Flammable gases come in a wide range, but they all have one thing in common - they can burn if they are exposed to an oxidant and a source of ignition.

Examples of flammable gases are propane, hydrogen, butane, methane, ethylene, acetylene, ammonia, ethane and silane.

Combustion

Fig: 2.1.11 Combustion

The substances which burn in the presence of air are known as combustible. Oxygen is an essential for

combustion to take place. During the process of combustion. Heat and light are given out. The ignition temperature is the lowest temperature at which a combustible substance catches fire. Also inflammable substances have very low ignition temperature. Fire can be controlled by removing one or more requirements essential for producing fire, the most common being oxygen. Water is commonly used to control fires. Though water cannot be used to control fires involving oils/gases or electrical equipment's. There are various types of combustions such as rapid combustion, spontaneous combustion, explosion, etc. There are also three different zones of a flame - dark zone, luminous zone, non-luminous zone. Incomplete combustion of a fuel gives poisonous carbon monoxide gas. For centuries, wood was used as domestic and industrial fuel. However now, it has been replaced by coal and other fuels like LPG , PNG, CNG, etc.

2.1.8 How to store flammable gas

Storing a flammable gas needs more precautions than regular gas types. As propane, hydrogen, butane, methane, ethylene, acetylene, ammonia and ethane gas are all flammable , and therefore it is essential to store these gas safely and correctly. Storing flammable gas in a cold, closable and dark area is critical. The cylinders must be kept away from any form of heat, sparks, flames or hot surfaces at all costs. The area where the flammable gas is stored must be ventilated and cold, and away from any consumable beverages.

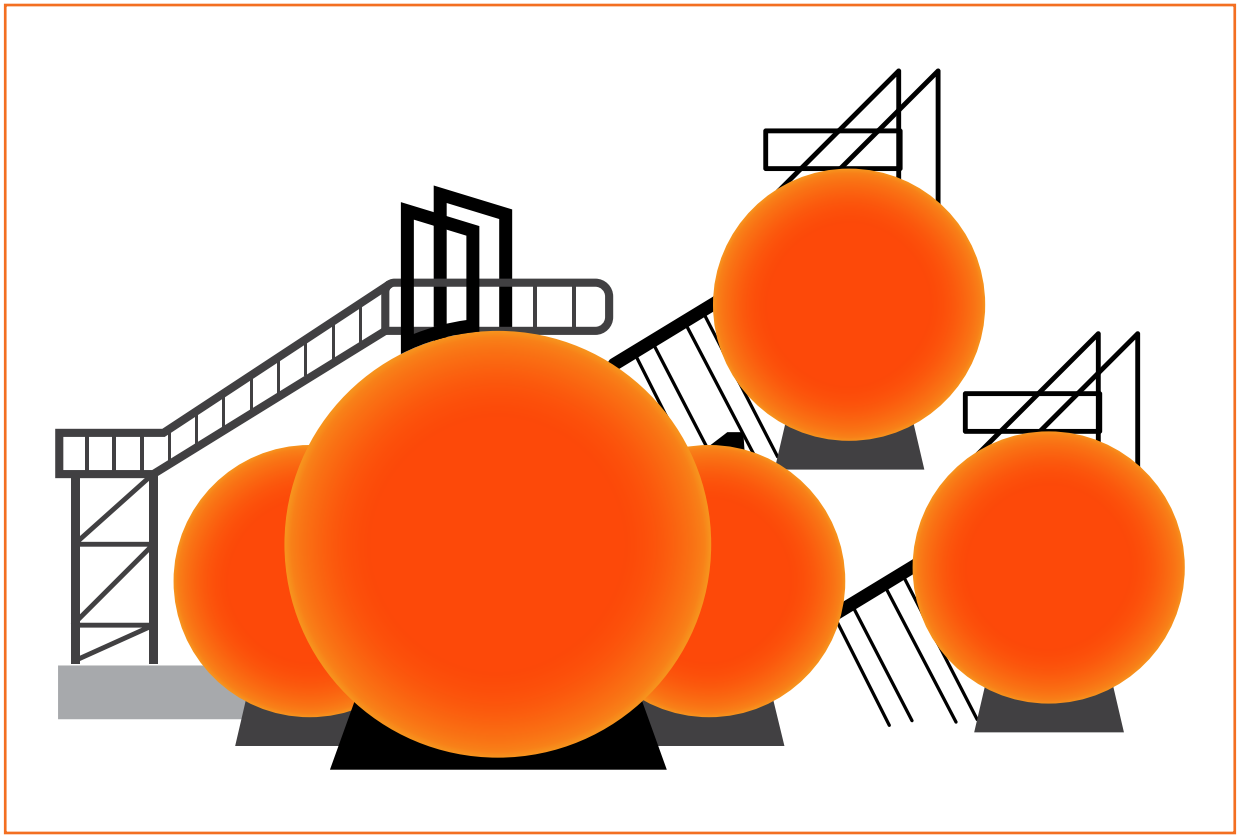

Fig: 2.1.12 Flammable gas store

Unit 2.2 Prepare for visiting the consumer's location

Unit Objectives

Unit Objectives:

1. Prepare consumer's index list and meter reading route as per billing cycle.
2. Record and update the consumer's index list regularly.
3. List the points for requesting a new connection and disconnection.
4. Identify route planning and optimization for gas distribution.
5. List the tools and equipments required in a gas meter reading activity.
6. State the types of gas meters.

2.2.1 Visiting the consumer's location

Before beginning for a job, it is important to keep in mind a few things.

- Gas meter readers must know thoroughly how to connect and disconnect meters at different locations. You should have a complete know-how of how to install a gas meter at a new location.
- Make sure to check that you have all necessary devices before beginning a day's work. Once you arrive at a customer's location meters all meters must be read with electronic devices for accuracy .After recording the readings the findings must be written down in a route book to enter into the computer at the end of the collection route.
- Maintaining a logbook is an important part of your job, logbook should have complete details of readings, inaccuracies, faults, etc.
- A gas meter reader should plan the route in advance, that ensures that all customers are covered using least amount of time and fuel.
- Ensure that your ID cards and uniforms are in proper order before visiting the customer's house. If the uniform needs repairing, do it before hand.
- A gas meter reader should know how to check meters on properties for defects and damage as well as for signs of any utility theft with unauthorized meter connections.
- For a gas meter reader customer service plays a large role. Meter readers must be able to keep a cool disposition in difficult situations, for instance, customers may get unhappy about disconnection due to non-payment or about any leakage or faulty connection. You must practice patience at all times and look for ways to deal with customers at a job.

Update the consumer's index list regularly

It is important to maintain an Index list of all the customers of a certain area. The list must include the details of the customers connections along with address and consumption. For any new connections made in your area keep updating the list. Also the list must be updated regularly with any disconnected connection, etc.

The Meter readers have to visit each and every consumer's premise in person and record the reading from the meter in the prescribed format provided by the company. All the mandatory fields (meter reading, signature, contact details etc) would have to be filled up while visiting consumers premise.

Request for a new connection

- To start the registration process, the customers will need to keep their proof of address and proof of identity ready.
- Alternatively , customer can avail E-KYC facility using their mobile phones and AADHAR number through an OTP sent by UIDAI. This facility can only be availed if the customer's mobile number is linked to their AADHAR number. if they adopt the e-KYC method, they do not need to upload their POI/POA document.
- On successful submission of the application, the customer will be given a reference number which can be used to track the application status.
- The registration amount maybe paid by the customer through secure online modes such as - net banking, credit card, debit card.

Request for a disconnection

1. **Temporary Discontinuation Process:** in case the customer do not need the piped gas connection for some time, the supply of gas can be temporarily disconnected on receipt of a written request from the customer at the respective gas connection customer care office. On receipt of request the authorized person will visit their premises and temporarily stop the supply of gas. Subsequently on written intimation the same would be resumed.
2. **Permanent Discontinuation Process:** in case the customer no longer wish to use piped natural gas permanently, a written request (for) about permanent disconnection can be sent by the customer at the respective gas connection customer care office. Prior to making such request kindly ensure that no payable dues are pending against their connection. On receipt of the request an authorized person will visit their premises and disconnect the gas connection.

2.2.2 Route planning

To accommodate multiple customers at short-notice requirements during a gas meter reader's work day, route planning done in advance helps him to do his job quickly and respond to any event at the lowest cost of transportation.

The route can be planned in such a way that the same locality/area/ or building in the same location can be covered on the same day/ weeks. This would reduce the travel time and would also save fuel charges and give enough time to the individual to interact with the customers and accomplish his tasks.

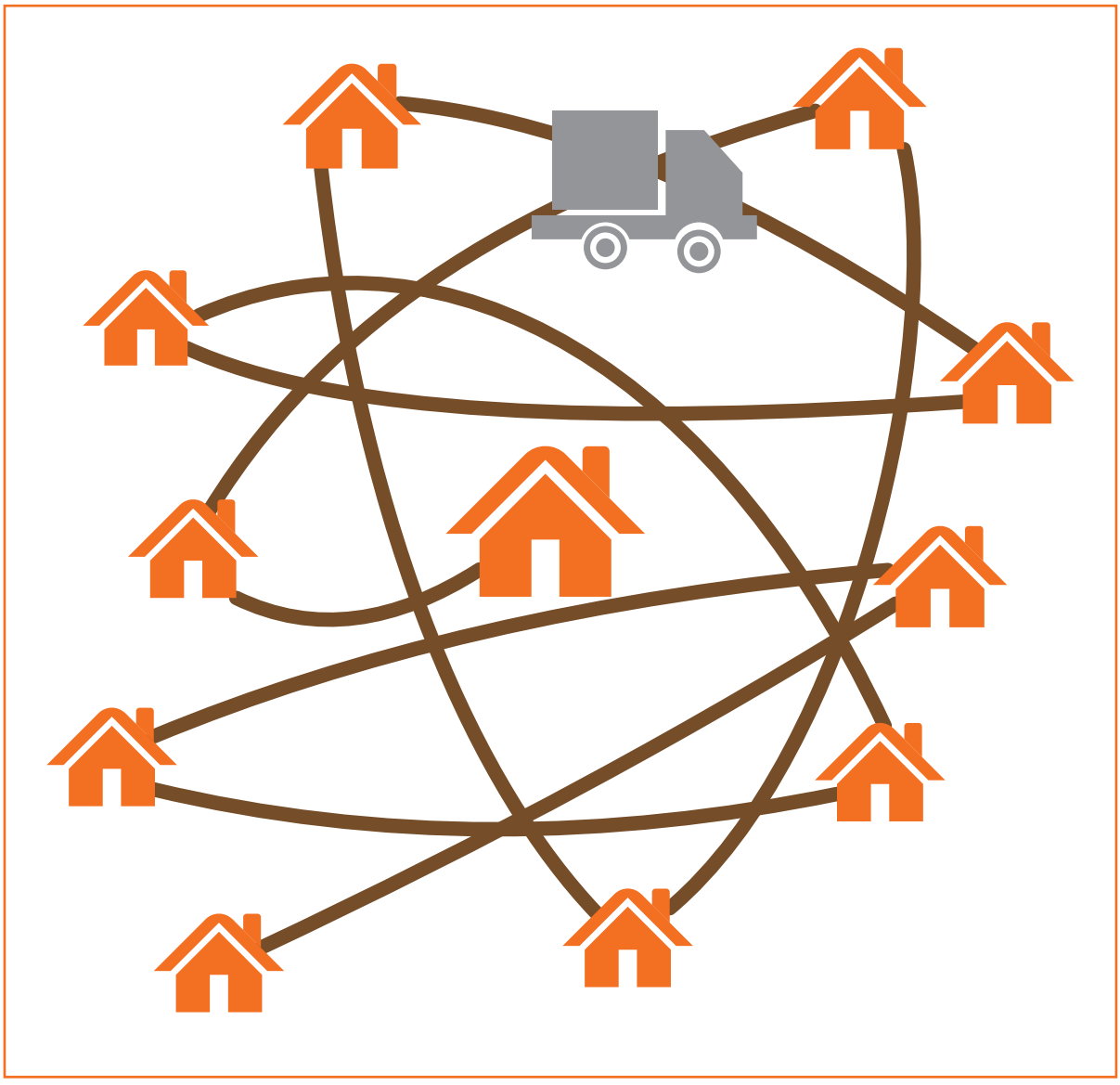

Fig: 2.1.12 Example of an unoptimizes route for gas distribution

Route Optimization

Route optimization can save time and fuel by planning efficient routes that factor in locations and avoid backtracking. Route optimization can save time and fuel, as the personnel would spend less time driving and dedicate more time covering more meter readings; less fuel is needed as less backtracking is taking place This helps deliver better customer service in an timely and efficient manner.

Route planning helps organise travel schedules based on locations. This helps to dedicate more time to attending to customer needs and taking the gas meter readings. Proper route planning would help him save time and enable him to complete his back-end work alongside the meter readings.

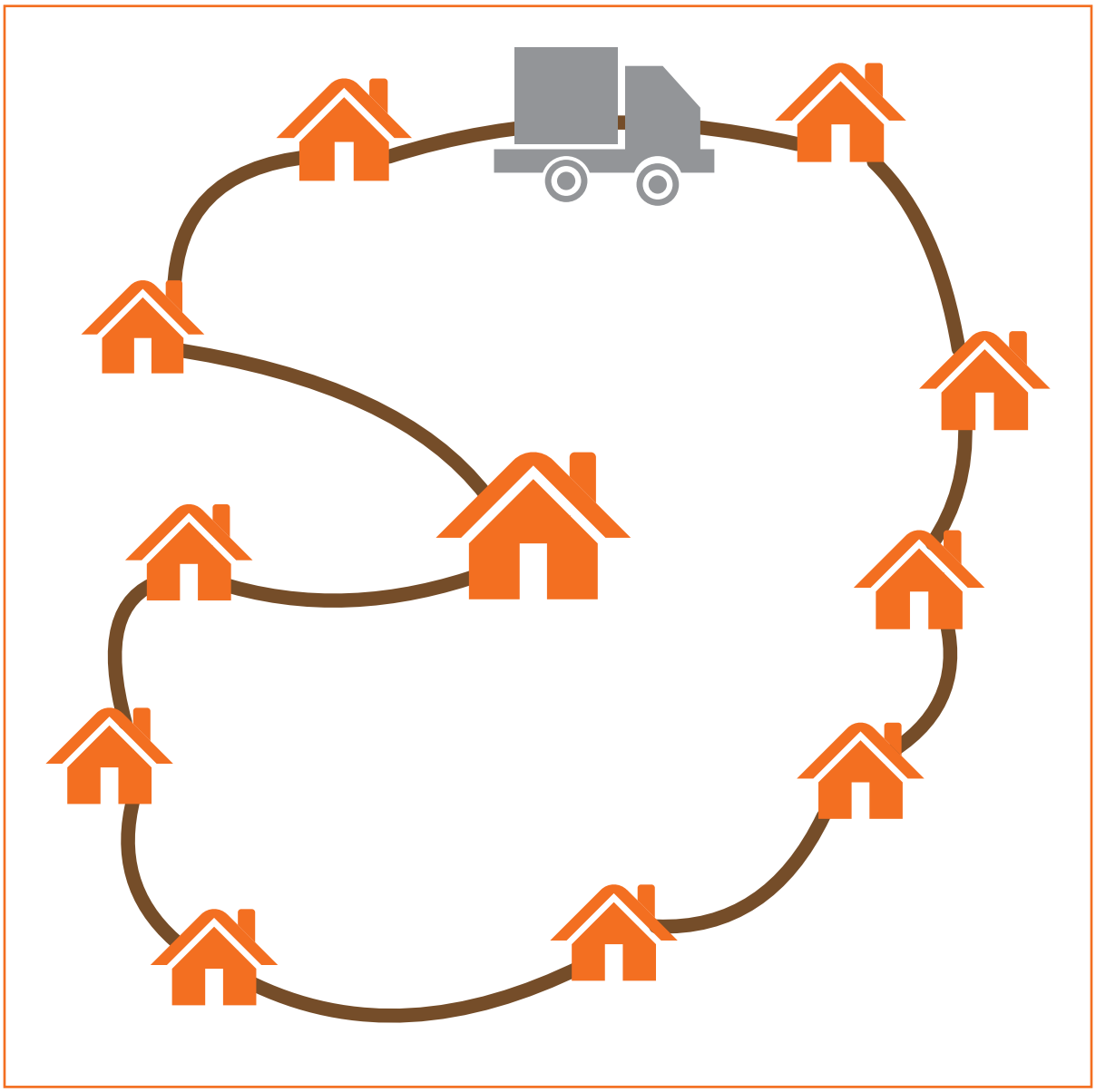

Fig: 2.1.13 Example of an optimizes route for gas distribution

2.2.3 Tools and equipments required in gas meter reading activity

- While visiting the consumers premises the gas meter reader must wear the complete set of uniform, caps, i-card etc as approved by their company. I-cards must be worn in such a manner which is easily displayed to the consumers. Bags may be carried in addition to the above to accommodate meter reading accessories.
- 'Sorry to Have Missed You' cards to be kept hand in advance provided by agency to Meter Readers.
- The gas meter reader would be issued with a hand held (provided by their respective company) device containing domestic consumer data prior to 3 days of start of billing cycle. The hand held device is to be kept ready and checked before heading to customers locations.
- **Hand Held Device:** Common Meter Reading Instrument (CMRI) is a hand held computer used to download data from electronic tri-vector meters. CMRI can be interfaced with portable printer for spot billing applications.
- Electronic reports for Static Tri-vector Meter data.
- No manual intervention & error free reports.
- Universal report generation irrespective of meter make.
- Reports effecting activities like energy accounting, technical loss.
- Calculation & deriving industry load patterns.
- Consolidated consumer reports for quick reference for higher-level management.
- Two meters data can be compared in single window like (main meter and check meter).
- Export option for various formats (XML, MIOS, PDF, XL, ASCII)
- Programming facility for all meters various type of analysis is possible common analysis report for various makes of meter consumption comparison daily energy report cumulative tamper report & etc.,

Fig: 2.1.14 Hand held device

Unit 2.3 Visit consumer premises to record gas meter reading

Unit Objectives

At the end of this unit, the participant will be able to:

1. Perform the verification of customer before reading a gas meter.
2. State the steps to be taken before meter reading visits.
3. Describe the process to read and record gas consumption reading.
4. Identify and list the possible reasons for abnormal gas consumption reading.
5. Describe the procedure to post an average meter reading if customer is unavailable.
6. Identify the compilation of data and bill generation.
7. Develop and maintain the records of visitation and meter reading.
8. List the procedures for commercial and industrial PNG connection.
9. Describe gas detectors for commercial and industrial kitchens.

2.3.1 Types of gas meters

Gas meters are specialized flow meters, used to calculate the volume of fuel gases like natural gas and liquefied petroleum gas. Gas meters are used in various applications like residential, commercial, and industrial set-ups that consume fuel gas supplied by a gas utility. Gases are significantly difficult to measure than liquids as the volume of the gas varies with a change in temperature and pressure. Gas meters calculate a defined volume, regardless of the pressurized quantity or quality of the gas flowing through the meter.

Modern day LPG or natural gas measurement is accomplished through the use of variety of meters. Different types of meters work on different measurement principles and the most commonly used one across residential units is domestic diaphragm type gas meter G-1.6.

Domestic Diaphragm Type Gas Meter G-1.6

- These are the most gas meter, seen in almost all residential and small commercial installations.
- The domestic gas meter is a volumetric diaphragm gas meter (hereinafter referred as **"diaphragm gas meter"**, which is mainly used in measuring the volume of gases.
- Is ideally suited for measuring natural, manufactured and LPG gases where low domestic gas loads are to be monitored.

The below diagram is an indicative figure showing the gas meter reader category discussed above

Appearance and installation

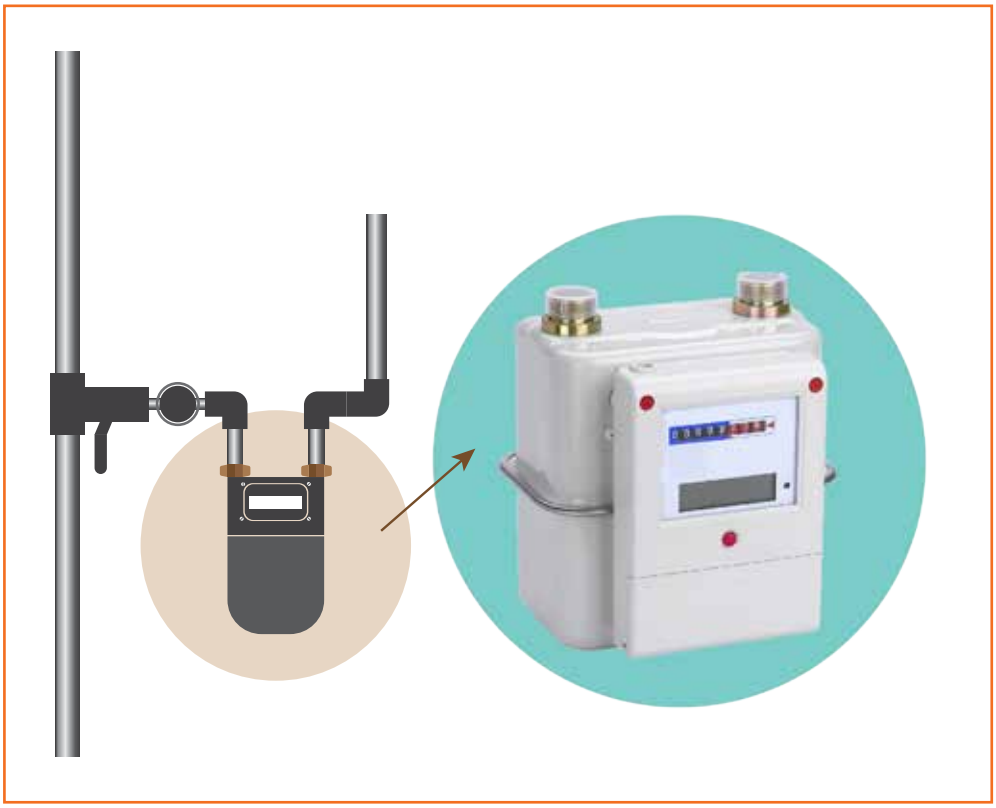

Fig: 2.1.15 Appearance of gas meter

Appearance and installation of a domestic diaphragm type gas meter G-1.6

Data logger

Data logger is a simplified pressure-monitoring device that is used for recording parameters as following:

- Gas pressures, the status of digital binary inputs. That data can be transmitted directly to the system. Ready to use almost instantly after installation.
- High-accuracy measurement of pressure and temperature
- Warning and alarm system if pressure exceeds limits.
- Effective and economic solution.

Several companies manufacture the data- logger and while the basic function remains this, a few additions might be available for different brands.

Fig: 2.1.16 Data logger

2.3.2 Verification of customer before gas meter reading

- The customer data base will be provided by the company before the gas meter reading visit.
- Verification of credentials of all customers as per their name, address mentioned and the meter number issued to them. When the verification is complete and all details have been captured, the gas meter reader may proceed to record the next meter reading.
- Customer signature along with telephone numbers & date of reading taken (Persons name wherever signature is refused) is to be obtained on Meter Readings taken as mentioned above.
- Where consumers premises is found locked at the time of visit of meter reader or if the meter reading could not be taken for any other reason, minimum 3 attempts to be made for obtaining meter reading at different times & different dates. A documented log containing details like date & time of each attempt along with the meter readers name & signatures to be maintained for every visit to the consumer's residence. The visits should generally be in minimum gaps of not less than 8-12 hours per visit specifically before 0800 Hrs and after 1900 Hrs. The meter readers will have to maintain individual log sheets wherever required containing date & time of all meter readings whether taken or not taken. 'Sorry to have missed you' cards to be left at locked flats. Meter readings shall be submitted to the gas company on or before 5th day of the month for the respective billing cycle. The information will be provided in electronic form and hard copy.

2.3.3 Step to be taken before meter reading visits

1. Meter readers would have to work on flexible hours (early mornings & late evenings) also on all holidays including Sundays.
2. While visiting the consumers premises the representative must wear the complete set of uniform, caps, I-card etc as approved by their company. I-cards must be worn in such a manner which is easily displayed to the consumers. Bags may be carried in addition to the above to accommodate meter reading accessories.
3. Uniforms & 'Sorry to Have Missed You' cards to be kept hand in advance provided by agency to Meter Readers. Uniforms and ID cards are extremely important to be up to the mark and worn properly at all times.
4. The dedicated Supervisor should liaison with the societies for smooth meter reading activity.
5. The Gas meter reader would be issued with a Hand Held (Provided by their respective company) device containing Domestic Consumer data prior to 3 days of start of billing cycle. The Hand held device is to be kept ready and checked before heading to customers locations.
6. Book Walk sequence to be followed for ease in meter reading.
7. If due to any reason SPOT Billing is not working then agency has to provide service for manual billing till SPOT billing application get restored.
8. Gas meter reader shall submit the meter readings collected through hand held device in (soft copy and hard copy both) at local office and share the same with local office or their superior.
9. For meter readings, which are out-sorted, and improbable, re-reading has to be carried out and

same has to be re submitted and distribute the Invoice before the completion of billing cycle.

10. In case a customer house is found continuously close or meter reading is not possible for any of the reason than meter reader should inform the reason of same by writing in meter reading sheet to concerned officer.
11. In cases where consumers premises is found locked at the time of visit of meter reader or if the meter reading could not be taken for any other reason, minimum 3 attempts to be made for obtaining meter reading at different times & different dates. 'Sorry to have missed you' cards to be left at locked flats.

2.3.4 Procedure to read and record the gas consumption reading

How to read a gas meter

Gas is measured by the cubic content unit. The gas bill, would be charged by metric cube.

As the gas moves through the pipe into the domestic pipelines, the force of gas flow turns the gear assembly inside the meter. As more and more amount of gas is consumed, the faster the red digits move.

Meter readings are done left to right. As you can see in the image below, there are 8 blocks indicating black and red digits located on the index of the meter. Out of the 8, 3 are marked in red color whereas the rest are marked in black.

For example if the index shows : 00122 435

This indicates that the gas consumed is 122.435 metric cube or 122 metric cube and 435 liters (1 metric cube = 1000 liters).

Steps to be followed for meter reading

- Every customer is identified with a unique lead no. at the time of connection process by the Business partner once the PNG has been installed at the premises.
- Each customer falls in a specific Portion.
- Before you begin with the reading, you need to be careful that the customer is present while the meter reading is being taken. You must take care that it is essential to have the presence of either 1 member of the family present.
- The meter installed at any premises has meter number written on it. The same should match with meter number mentioned in the software.
- It has to be performed once in every 1-1.5 months.
- Read the dials from left to right.
- Ignore the figure to the right of the comma 0 8 5 3 2XXX.
- The meter digit is in 2 parts black and red. The Black part denotes the whole number and Red part denotes the decimal number.

Fig: 2.1.17 Gas meter reading

- If the customers are unavailable at home **"we missed you"** note along with details of Self Billing tips through their billing app (available on Google Play store or Apple i-store) or sharing the meter reading on the WhatsApp no. mentioned should be left.

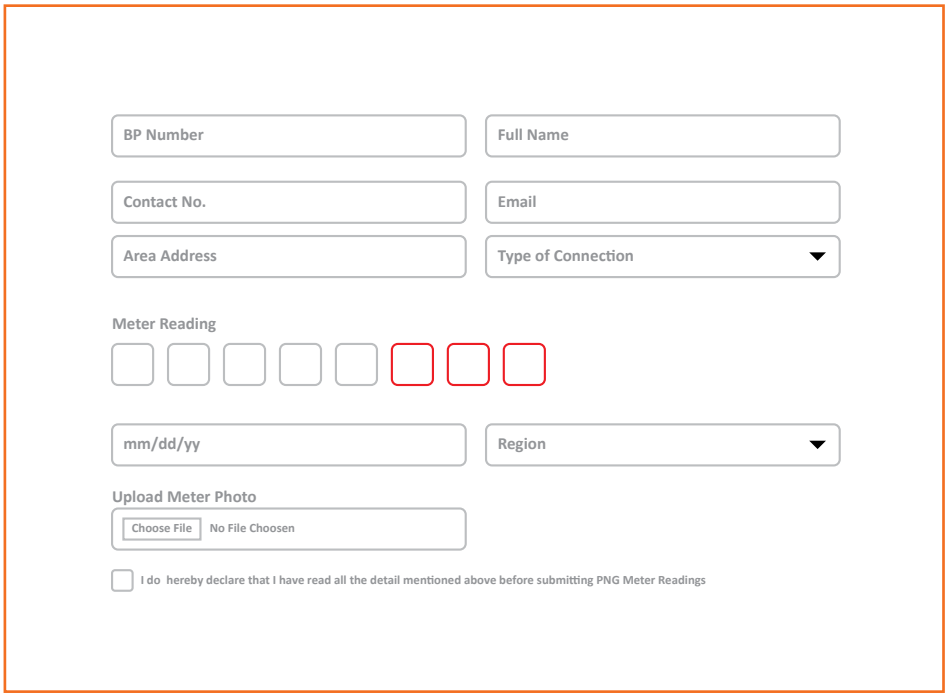

Fig: 2.1.18 Self billing apps screen

- An estimated bill is prepared if the meter reading due to any technical reason like non availability of customer or unlikely meter read.
- The meter reading taken from the premises of customer is then to be manually entered on the software.
- Digital proof in the form of an image is to be uploaded of the same.
- You can also educate the customers about taking their own readings and monitoring their consumption in order to reduce unnecessary wastage.

2.3.5 Possible reasons for abnormal gas consumption readings

If the Meter is Faulty:

- Guide the customer to take a reading for 7 days continuously.
- Switch off any gas that is being used at the time of the meter reading.
- Check the meter right away after doing this, and again 30-60 minutes later to see if anything has changed. If at all necessary, switching on each gas appliance one at a time while testing the meter.

Meter tampering:

Fig: 2.1.18 Meter Tampering

Before beginning the meter reading, you must check for any meter tampering. Unauthorized removal of a meter, severing of a meter seal, opening of a meter base, modifying an entrance cable in some way, or self-reconnects that are not performed by an approved employee or representative from the gas company.

Meter tampering is not only illegal, but also dangerous. It puts everybody in danger, including the people who are taking the gas meter readings. Potential electrical shocks, sparks, surges, explosions, and subsequent fires may cause injuries and/or death.

2.3.6 How to post an average meter reading if customer is not available

- In case a customer house is found continuously closed or meter reading is not possible for any of the reason then meter reader should inform the reason of same by writing in meter reading sheet to concerned officer.
- In cases where consumers premises are found locked at the time of visit of meter reader or if the meter reading could not be taken for any other reason, minimum 3 attempts to be made for obtaining meter reading at different times & different dates.
- A documented log containing details like date & time of each attempt along with the meter readers name & signatures to be maintained for every visit to the consumer's residence. The visits should generally be in minimum gaps of not less than 8-12 hours per visit specifically before 0800 Hrs and after 1900 Hrs.
- The meter readers will have to maintain individual log sheets wherever required containing date & time of all meter readings whether taken or not taken. 'Sorry to have missed you' cards to be left at locked flats.
- However to generate a bill in case of absence of the customer after multiple visits, take the average of the last three meter readings of the customer mentioned in the logs to generate a bill.

2.3.7 Compilation of data and bill generation

- The Meter Reader shall trace and track anomalous connections such as : active connections but not in PNG user list of company, connections registered with company but no billing has been initiated for various reasons or any other consumers who has not been billed.
- In response to customer inquiries, the Meter Reader must be able to respond and clarify the meter reading activity status respectfully. A representative from the agency office will be available for any form of reconciliation, relevant internal and external communication, and administrative work.
- Identification of cases to report misuse of PNG domestic gas for commercial purpose.
- The Meter Reader shall submit the meter readings collected through Hand held device in (soft copy and hard copy both) at local office and submit the same to their supervisor.
- If a customer's house is found to be regularly close or meter reading is not possible for any reason, the meter reader should notify the concerned officer/supervisor by writing the reason on the meter reading sheet.
- The company is required to provide a customized software for bill generation. The input

requirement for the software (fields) will be as per their requirement, and the data collected by the meter reader. The software should generate bill as per the format with details of the customer (CRN No, address, meter number and payment details) should be generated by the software.

- Meter readers shall collect the bills generated from their respective office and distribute the same to the individual consumer within two days of date of issue of bill.

2.3.8 Maintain records of visitation and meter reading

The meter reader should at all times behave in a proper manner during taking meter reading. They should be polite and courteous.

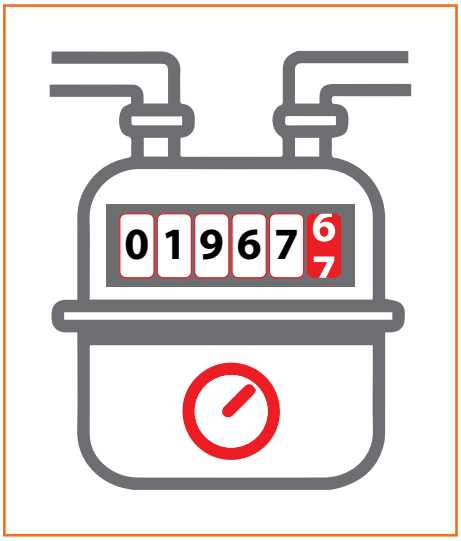

Fig: 2.1.19 Meter reading through digital meter

They shall validate/check all meter readings with clear snaps before handing over to the company supervisor. There shall not be any deviation in meter reading entered in application and as in snap.

Successful meter reading: In case of Android based mobile app and spot billing, the clear and correct picture of meter reading, meter number and other details as suggested by respective company is uploaded on the billing portal.

Every meter reader will have an alternate meter reader. If any change is done in the assignment of the meter reader they should notify their superior. The alternate meter reader is to be used only if the previous one is not working accurately.

Meter reading has to be collected and complete is required to be submitted as per Bi-monthly billing schedule given by the company.

The Meter Reader must always be in their best behaviour and complete uniform as their superior may carry out surprise checks in field and if it is found that the meter readers are either not carrying ID card or not in proper uniform.

The dates, time lines and geographical areas for each cycle will be informed to agency from time to time.

The Meter Reader shall utilize all the modes to get in touch with the customer which includes personal visits, telephone calls, SMS email etc. to ensure that customers are contacted without fail.

Successful bill distribution: The bill is handed over to the customer and proof of delivery is obtained receiving is successful bill distribution.

2.3.9 Procedure for commercial and industrial PNG connection

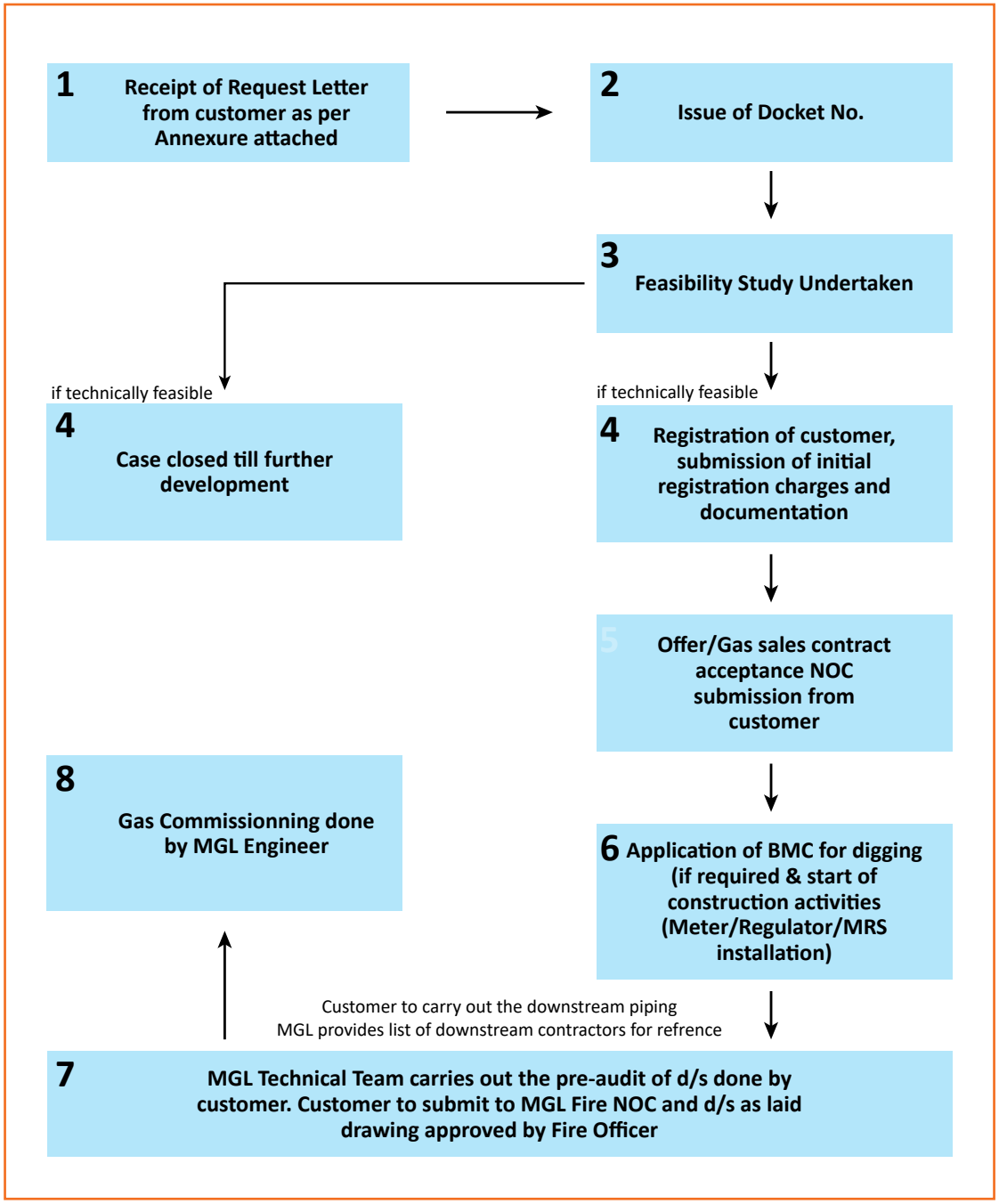

Fig: 2.1.20 Procedure for Commercial and Industrial PNG connection

2.3.10 PNG gas detectors for commercial & industrial kitchens

A. The gas detector can be applied to use in the following:

Fig: 2.1.21 PNG gas detector equipment for commercial and industrial kitchens

- Kitchen and Canteen areas of Industrial units, Commercial or residential premises, Hotels, Restaurants, Cafeterias etc.
- LPG & other Gas pipeline projects.
- Gas Banks, Bullet yard and storage yards of LPG.
- Gas metering station.

Features

- PESO/CCOE tested Flame pro of Enclosures.
- It has an inbuilt buzzer cum flasher for alarm alert.
- It has a Plug-in or standalone type of power supply feature.
- Range of LPG/ PNG Gas leak detection is 0 to 100% LEL.
- These detectors are suitable in hazardous areas, specifically designed for detection of LPG / PNG group of gases.

B. The combustible gas leak detector with visual leakage indicator, can detect gas leakage. Can be used to detect hydrocarbons (methane, natural gas, ethane, propane, benzene, Acetylene, propane, N,N,N,n, Pentane, hexane, gas oil, toluene), halogenated hydrocarbons (methylchloride, methylene chloride, three chloride, vinyl chloride), alcohols (methanol, ethanol) etc.

Features

- Portable detector for detecting all combustible gas.

Fig: 2.1.22 Gas leakage detector

- Long flexible stainless probe reaches all areas.
- Audible semiconductor probe and auto fast warm-up.
- Instant response, pinpoint leak position and low battery indication.
- Audio & visible leakage alarm indication and adjustable sensitivity.
- Compact size, light weight, easy to carry and operate.

Exercise

Choose one option amongst the following and complete the sentence.

1. "Natural Gas is a composition of ....."
   (a) Liquids (b) Solids
   (c) Hydrocarbons (d) Different forms of fuels

2. "..... has got a track record of almost 100% reliability in its gas"
   (a) MGL (b) LPG
   (c) PNG (d) HSD

3. "LPG stands for ....."
   (a) Liquid Petrol Gas (b) Light Petrol Gas
   (c) Liquefied Petroleum Gas (d) Lit Purified Gas

4. "Flammable gases are explosive when they are mixed with .....in the right proportions."
   (a) liquid or Solid (b) Solid or Oxygen
   (c) Air or Oxygen (d) Liquid or Air

5. **Complete the sentence:**
   Biogas is a .....
   .....
   .....
   .....
   .....

6. **Complete the sentence:**
   Natural Gas is .....
   .....
   .....
   .....

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/nPXZhJP1EpM

Flammable vs. Combustible liquids

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/jH55BFl8tnI

How to use CMRI

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/WKnY0M0Ei94

How do I read my gas meter?

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/gIYBfv6dCZU

Checking for gas leaks in your home

Notes

Notes

Skill India
कौशल भारत-कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

HSSC
HYDROCARBON SECTOR
SKILL COUNCIL

3. Handle consumers and their queries

Unit 3.1 - Handle consumers and their queries

HYC/N3701

Key Learning Outcomes

At the end of this Module, the participant will be able to:

1. Explain how to greet consumers with etiquette.
2. Demonstrate how to listen and respond properly to the queries of the consumer.
3. Describe the safety precautions and do's and don'ts to be taken in case of gas leakage.
4. Explain how to record the queries of the consumer and their escalation procedures.

Unit 3.1 - Handle consumers and their queries

Unit Objectives

At the end of this unit, the participant will be able to:

1. Identify the communication process and also describes the elements in the process of communication.
2. Describe the Constructive communication and Listening Skills.
3. Recognize the barriers to Effective Communication.
4. Identify the meaning of social interaction.
5. Describe and conduct the English greetings for formal/professional situations.
6. Describe and perform the English greetings for informal situations.
7. Explain the meaning of customer relations.
8. List the importance of customer relations.
9. Evaluate the customer service to understand how customer view business.
10. Illustrate and list down the ways of handling customers for 100% satisfaction.
11. Explain the Do's and Don'ts in case of gas leakage at workplace.
12. List down the safety tips against gas leakage.
13. State the fire safety precautions while using PNG.
14. Understand and perform the maintenance of PNG.
15. Conduct the responses to gas emergencies.
16. Understand the reason of customer complaints.
17. Relate the most common customer problems.
18. Comprehend the tracking and categorizing of customer complaints.
19. Describe the steps to handle the customer relations.

3.1.1 Introduction to effective communication

Communication is a key element in every individual's life. Being able to communicate effectively is perhaps the vital part of all life skills. Communication involves exchange of ideas, information, thoughts with people around you.

Being in a progressive world and building our careers, the nature of the skills that are critical to success changes adequately. For many of us we are first accountable for performing determined tasks, often technical in nature. Our success is dependent on individual knowledge, actions, and contributions. Technical proficiency is often enough.

But technical expertise will not be enough every time. One's success will depend more and more on it's interpersonal skills and their ability to evolve effective work relationships with key individuals.

Managerial jobs involve complex conglomerations of relationships with people who make constant demands, often varying and obscure demands. A manager's job encompasses reconciling these conflict expectations. Not surprisingly, soft skills and conflict resolution skills rank among the most important for managerial success.

Certainly, not all connections end up in easy ways but with people in organizations typically devoting over 75% of their time in interpersonal interactions, a very large amount of problems in organizations are communication problems.

Despite the massive development in information technology, it might be astonishing to find out that at the origin of many firms and management issues are simple communications breakdowns. But this should not really be that startling. We are basically social animals and no matter how **"bureaucratic"** a company is, no matter how much communications have **"become digital,"** interpersonal connections can never be removed from personal feelings, styles, choices, and preferences that we bring to any of our human interactions.

As being a social animal many of our greatest joys and most deep sorrows, highest peaks and deepest valleys, occur in relationships/interactions with others. For many of us a large proportion of our interactions take place in our managerial or professional lives. While we may not bring the right same needs to both personal and professional settings, many of our basic needs such as achievement, recognition, respect, power, and control are as likely to influence interactions at work as well as in our personal lives.

Consequently, our personal life and our managerial life as well depend on our skills in interpersonal behaviour and communication. We can never distinguish our personal **"self"** from our professional **"self."** We may work on managerial tasks but we never work only on managerial tasks; we also work on whatever personal and social requirements are important to us.

Effective communication occurs when it is shared properly and effectively to its course of destination. The message that is sent is the similar message that is received. There must be a mutual understanding between the sender and receiver for the dissemination of ideas or information to be successful.

Effective communication may be defined as:

- Using a proper language that is appropriate to other's level of understanding.
- To ensure that others obtain the information or knowledge intended.
- Developing relationships with others.
- Talking with people in a manner that facilitates openness, cooperation, and honesty.
- Providing feedback, which is a must.

In this chapter we will cover the basic process of communication focusing mostly on interpersonal communication and then we will cover some of the most difficult communication issues managers face- providing constructive and effective feedback and performance appraisal. More specifically, we need to develop the ability to understand:

- What is really happening in an interaction?
- Why do other people behave as they do?
- What can I do about it?

3.1.2 The communication process

Communication skills, such as your capability to read, write, speak, and listen, are crucial for working in industry. Effective communication is a prime safety issue. You need finer skills in communicating to explain the work you do to your colleagues, and how you communicate with clients decides how far the participant will be able to know move up within your company. Poor communication skills will hold you back even if you gain excellent technical skills. It all initiates with listening and interpreting rightly what was said. Most of your daily work orders will be verbal, and miscommunication can be both risky and expensive. The labor field is packed with jargon, words specific to your profession, but you will need to convey with those outside the industry who derive little about what you do. Lastly, you will be judged by outsiders on your capability to express at a formal, business level. The words you speak, how you say them, and how neatly and precisely you write them all send out messages about your capability. You may be an outstanding carpenter or bricklayer, but if you cannot express what you do, you will lose work. You require to evolve your skills to read, write, speak and listen as you shape your skills.

Here are the different measures in the process of communication:

1. **Sender (Source):** sender is a very important and primary element in the process of communication. The sender is also known as source. As, it is the source of the intended message that is to be received by the receiver. The intended message or information of the sender has a purpose that is to be communicated to one or more people. For example; a manager has to communicate information regarding the tasks to be accomplished or a production deadline to be met by his subordinate. Without a reason, intent, or desire, the sender has no information/message to send.
2. **Encoding:** the next stage is encoding. Encoding is turning your thoughts or ideas into communication. Here, the sender while encoding the message uses or is supposed to select only those words, gestures, or symbols that he/she considers to have the same meaning for the receiver. The sender has to keep in mind the level of the receiver and accordingly communicate with him/her in the way the receiver comprehends it.

   The intended message may be in any form that can be explained by the receiver. Speech is heard; words are read; gestures are seen or felt and symbols are explained.
3. **Channel/transmission:** the channel is a medium of transmission of a message from sender to receiver. It involves dissemination of information, thoughts, or ideas through different mediums like telephone, mail through post, internet, radio, tv, press etc. For communication to be robust and efficacious, the channel/medium must be suitable for the message. A phone conversation is not the right channel/medium to convey a problem or an issue regarding your gas meter.

   An express mail may be more right. The requirements of the receiver must also be considered in selecting a channel. If the receiver is illiterate, sending the message through postal mail is not relevant. Similarly, you cannot select the medium of telephone, if the receiver does not have a telephone with him/her. Therefore, in picking up the proper channel, the manager must decide whether feedback is just or not.
4. **Receiver:** the receiver is the person who gets an intended message from the sender. There may be just one receiver or a multiple number of receivers. The message must be crafted with the receiver's background in mind.

An engineer in a software organization should avoid using technical terms or jargons in conveying with his family members or friends. It should be perceived that if the desired message does not reach a receiver, no communication takes place. Even when the message reaches the receiver, if he/she cannot catch it, again there is no communication.

5. **Decoding:** decoding is the way through which the receiver interprets the message and translates it into pertinent information. It may be remembered that decoding is determined by the receiver's past experience, personal judgements of the symbols and gestures, expectations, and interdependency with the sender.
6. **Noise:** noise is the disturbing factor in the process of the communication. It hinders effective communication and diminishes accuracy of the message. The message may be explained differently than intended by the sender. Like the sound of a construction, vehicles or any other form of noise in the process of communication can hinder and thus hamper the quality of messages resulting in no communication.
7. **Feedback:** feedback is the receiver's reply to the sender's message. The receiver conveys reaction to the sender either through words, symbols or gestures. It is the reversal of the communication process where the receiver becomes the sender and vice-versa. Unless the receiver replies to the message, the communication process is deficient. Feedback helps the sender transform his/her message, if needed. It also allows the receiver to clear queries on the message, ask questions to build his confidence and allow the sender to know the efficacy of the message. Feedback of information makes the communication process finish.

Feedback offers the following benefits:

- It enables the sender to build on the communication with the receiver.
- It enables the receiver to clarify queries on the message and, therefore, represent better.
- Enabling receivers to ask questions creates confidence and they are more confident of their work performance.
- It allows the sender to know the efficacy of his/her message; whether or not the receiver has inferred the message in its correct meaning. Feedback makes the communication process finish.

3.1.3 Constructive communications - listening skills

See, conflicts and confrontations are part of life. Whether it's personal or professional, You need to handle it with patience and with better manners altogether. If handled constructively and robustly, disagreements can eventually benefit.

Regardless of your position, status or environment, the rules of constructive communication stay the same for everyone. Using them will assist you to avoid irrelevant personal conflict and find ways to alter dissents into improvement or growth. This is especially easy if you are broad-minded and ready to accept another's point of view, not being scared to put aside your dignity.

Listening is one of the most essential skills you can have. How well you listen has a major influence on

your job effectiveness and on the quality of your relationships with others in your surroundings.

For instance:

- We listen to get information.
- We listen to understand.
- We listen for enjoyment.
- We listen to learn.

According to Edgar Dale's Cone of Experience theory, we only retain or remember between 25 percent and 50 percent of what we hear. Clearly, listening is a skill that we can all gain from improving. By becoming a better listener, you can improve or boost your productivity, as well as your ability to influence, persuade and negotiate. What's more, you'll avoid conflict and misunderstandings. All of these are obligatory for workplace success!

Here are some of the barriers to effective Communication

- Perceptions & language differences.
- Information overload.
- Many levels of information flow.
- Poor listening.
- Use of jargon.
- Environment.
- Distractions.
- Conflicting verbal & non-verbal cues.
- Verbal communication- basics and tips.

So what are the keys to effective listening. The following list highlights some of the keys:

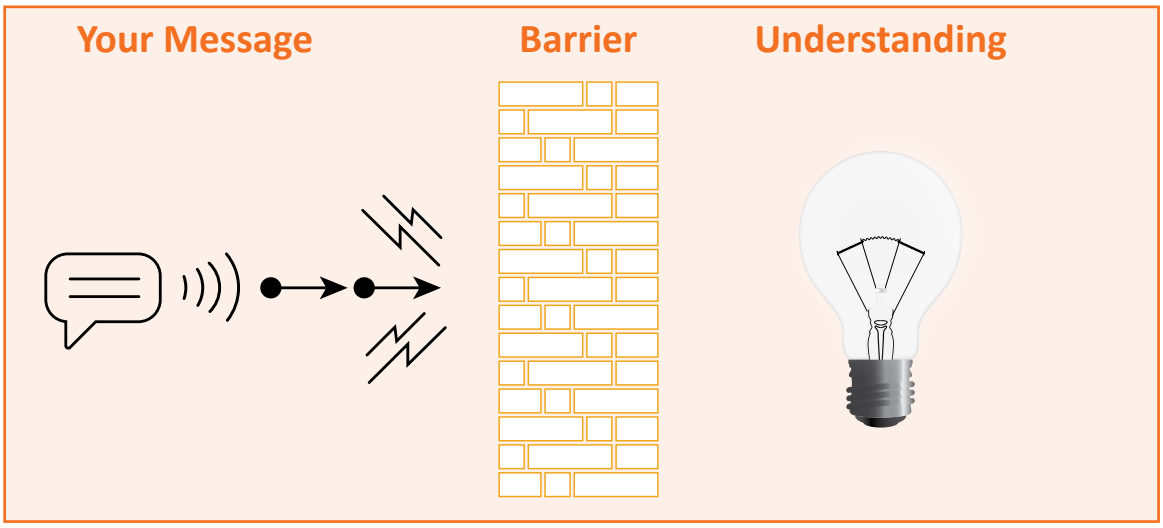

Fig: 3.1.1 Effective listening

Active Listening Skills

- Stop talking- listen openly and with empathy to the other individual.
- Try not to be defensive.
- Look at the person; be patient.
- Ask the other person for as much in particular as he/she can provide; rephrase what the other is saying to ensure you perceived it correctly and check for understanding.
- Respond in an interesting way that shows you understand the problem.
- Concern attend to non-verbal cues, body language, not just words; pay attention to both emotional and cognitive messages (eg. anger).
- Stay in an active body state to help listening; fight distractions; use eye contact, motivating gestures
- Ask the other for his views or suggestions.
- Maintain the self confidence and dignity of the other person lead by example (at work) take notes; analyze on a specific follow-up action and date.

3.1.4 Social interaction

Social interaction is a strong series of social actions between individuals or groups who adapt their actions and reactions due to actions by their interaction partner(s). Social interactions can be distinguished into accidental, recurrent, regular and controlled.

Fig: 3.1.2 Social interaction

Social interaction is a social interchanging between two or more individuals. These interactions develop the basis for social structure and therefore are a key thing of basic social investigation and analysis. Social interaction can be seen between groups of two (dyads), three (triads) or big social communities.

Social structures and cultures are based upon social interactions. By socializing with one another, people make rules, institutions and systems within which they look to live.

When greeting someone, it is relevant to use the appropriate level of formality for each situation. Are you comfortable in utilizing formal or casual greetings in English? Do you know when you have to apply them? Or what about slang? This is exactly what this lesson will assist you do so you can greet others in English with mere confidence in any case. “When greeting someone, it’s crucial to utilize the right level of formality for each state of affair. And that’s exactly what we’ll help you learn in this chapter.

3.1.5 English greetings for formal/professional situations

Greetings are a simple way of saying hello to someone. In the english language, there are multiple ways in which this can be done. Greetings are classified in two situations:

- Formal greetings
- Informal greetings

It is very crucial to be able to choose a suitable greeting for every situation. We will be looking at this a little more closely in the coming part.

Meeting someone for the first time is often a hard task, especially if English isn’t your first language. What should you say?, What should you do?, What’s considered polite or either rude?. These are the things that give everybody a nightmare. Therefore, to make you more comfortable in English greetings for formal situations, you need to understand what formal greetings are.

There are many situations in which we may need more formal or business professional language in English.

Some common examples include:

- Business meetings & negotiations.
- At a job interview.
- Communicating with high-level management.
- Saying hello to the company president or CEO.
- Showing respect to elderly individuals or people we do not know well.
- Meeting new business colleagues.
- Communicating with new clients, high-level clients, angry clients In these situations we use more formal or professional language to show respect, to show the importance of a situation or the person or to keep a professional tone. Use the example words and expressions below to appropriate greet individuals or groups and start conversations.

Formal/ Professional Greetings: when meeting someone under formal or professional circumstances like meeting an important person for the first time or business meetings. You might apply some of these more formal greetings. Let’s look at the points.

- **Good morning/afternoon/evening/day** – These greetings are used as a replacement for **“hello”** and are often used in formal or professional situations depending on the time of day. For example: Usually before 12 pm, we say **“Good Morning”**, and after 12pm, we say **“Good Afternoon”**, and from around 6 pm we say **“Good Evening.”** Although, you can use the term **“Good Day”** at any

point during the time of morning or afternoon.

- **How do you do?:** It is used as a polite greeting when you meet someone for the first time. This is quite a very dated greeting, but still commonly used in very formal meetings. You are likely to hear a response such as 'very well, thank you' when asking this question.
- **Pleased to meet you/ Nice to meet you:** This is a common greeting which is often used when meeting someone for the first time. It is common in formal situations but may also be used in a less formal situation on a first meeting.
- **How are you doing?/ How have you been/ How have you been doing?** This is a polite way of asking how someone is and is often used in connection with words like 'hello' or 'good morning/ afternoon/evening' etc.

Formal Greetings Examples:

Ms. Sheena Rajput and Mr. Vikas Khurana are meeting for the first time. Read their conversation below:

Vikas Khurana: Hello! Good Morning, I'm Vikas Khurana.

Sheena Rajput: Hello! Good Morning, Nice to meet you Mr. Vikas. My name is Sheena Rajput.

Vikas Khurana: It's a pleasure to meet you Ms. Sheena. How do you do?

Sheena Rajput: Same here, I'm very well, thank you.

3.1.6 English greetings for informal situations

When greeting another person in English, you should use a greeting suitable to the relationship you have with that person. For example, you would greet your supervisor differently than you would greet a friend you see at the mall. With your supervisor, you'd use a formal greeting, such as, ''Hello, how are you?'' With your friend, however, you might say something like, ''Hey! What's up?'' This is an example of an informal greeting.

Let's take a look at some common types of informal greetings that you can use with friends, family members, classmates, and co-workers.

Example situations include:

- In the office with your team and colleague.
- Meeting or a lunch with a regular client.
- Networking events.
- Trade show or job fair.
- Conferences.
- Greeting neighbours.
- Seeing an acquaintance unexpectedly (for example, seeing someone you know at the grocery store or in a hotel) It is often also very common to shake hands with someone when you greet them. This is common for business contacts and acquaintances.

- Hi – This word, which is another word for 'hello' is probably one of the most commonly used greetings in the English language and something you will hear very frequently.
- Hey (there!) – Another variation on the word 'hello'. this is used as a friendly, upbeat greeting.
- How's it going? -This is an informal way to ask someone how they are and is used often in place of 'hello.'
- How you doing? – Once again, this is a way of asking how someone is and is something that is commonly said in English.
- Alright! – This is a very common greeting which is used to say hello to someone.
- 'What's up?' Many people will use the term 'what's up' but often it is shortened to 'sup. It is an idiomatic phrase, or an inquiry about a current or recent state of affairs
- How's things/how's life? – Rather than asking the more formal question 'how are you?' many people use this less formal term.
- Long time, no see – This greeting is usually used when buMPINg into a person who you have not seen for a long time.

Formal Greeting	**Informal Greetings**
Good Morning	Hello
Good Afternoon	Hi
Good Evening	How are you doing?
How do you do?	How have you been?
How are you?	How are things going?

Formal Response	**Informal Response**
Good Morning	Hello/Hi
Good Afternoon	Hi
Good evening	Fine, Thanks and you?
Very well, thank you	Great, Thanks

Formal Closings	**Informal Closings**
It has been pleasure, goodbye	I have to go now, bye
Thank you for your time, goodbye	I'll see you later/around bye
	Have a nice day, bye

Greeting a person you haven't seen for a long time (Formal)

- It has been a long time.
- It's been too long.
- What have you been up to all these years?
- It's always a pleasure to see you.

- How long has it been?
- I'm so happy to see you again.

Greeting a person you haven't seen for a long time (Informal)

- How come I never see you?
- It's been such a long time.
- Long time no see.
- Where have you been hiding?
- It's been ages since we last met.

Informal Greeting Examples:

Vaidehi Mishra and Aman Sharma are friends and meeting after so long for. Read their conversation below:

Vaidehi: Hey, How you doing?

Aman: Hi, thanks, I'm doing very well and how have you been?

Vaidehi: Good to hear, Yeah! I'm good. Just busy with my new start-up.

Aman: That's amazing! Happy for you buddy.

3.1.7 What are customer relations?

Customer Relations is an approach that describes the way that an organization will engage with its customers to improve the customer experience. It includes a wide process of fostering positive relationships with your customers - the aggregate of all customer interactions and experiences.

No matter how distinct the different roles of your team, every action taken by Gas Meter Reader in the business contributes to - or detracts from - a positive customer relationship.

What is the importance of customer relationship?

Faithful and regular customers are essential in any business growth & success. In fact, there's a 60-70 percent chance of making a sale to a current customer for business, while there's only a 5-20 percent chance for new prospects. Here are the following points that Gas Meter Readers must know for building customer relationships.

- **Customer retention:** When your customers know they'll have a positive experience with your business, it's very difficult for a competitor to woo them away.
- **Customer loyalty:** Having positive relationships with your customers inspires a sense of faith that overcomes many common reasons why customers defect, including cost and convenience.
- **Customer acquisition:** Helps in acquiring new customers, when good words are spread about your services by your existing customers.
- **Customer satisfaction:** Given that most customers will just stop patronizing a business instead of complaining, positive customer relations make it easier to get customer feedback.

Evaluate customer relationship

"Customer is a King" and this means customer satisfaction is an essential key point of every business. After all, the business is all for the customers. Therefore, it is a duty of one to focus on customer's satisfaction by providing them with an abundance of services with quality too. Customer satisfaction is a prime indicator of customer service. Therefore, a gas meter reader needs to understand and measure the customer satisfaction.

There are several ways, where one can evaluate customer service to understand how customers view a business. You can:

- Ask clients what their thoughts, ideas, or opinions are on your business.
- Conduct surveys in malls or stores by providing questionnaires or feedback form online; a better way to evaluate the customer's view.
- Appoint a mystery/secret shopper to try your service and get feedback.
- Notice interactions between employees and customers- a better way to see the things more clearly.
- Moreover, read or visit online forums or websites.

Build strong customer relationships

The following points mentioned below suggests that how a Gas Meter Reader should build sturdy customer relationship for a long run.

1. **Know your Audience/Customers:** The very crucial step is to get to know your customers. You can't promote good relationships with your customers' if you fail to understand your customers' requisites and tap into their emotions and psyche. To understand your customer's needs, gas meter reader needs to put your sales hat on and think like a salesperson; how do they interact with customers to develop a rapport?

   Once you get to interact with your customers, you can discover what enkindles your clients along with their habits and interests. And when you understand the needs & expectations of customers, it will automatically become easier for you to communicate with them and deliver on your promise.

2. **Tailor your communications:** A gas meter reader can connect with the customers; have a conversation with them. After all, communication is an essential way to build relationships. The easiest way to do this is through email communications.

   Now, this is more than random email blasts or monthly updates via reports (for you service-based businesses).

   Tailoring your client communications involves personalizing your messaging, based on your customer data, and communicating in ways that are of value to your customers. You don't only want to reach out to your customers when you have something to sell. Instead, keep them up to date on the latest happenings within your business or industry, send them special offers around the products or services they're most interested in, and continue to educate them by being a source of valuable information.

3. Strive to exceed expectations through customer support -The key to exceeding expectations is to under promise and over deliver. The true definition of exceeding customer expectations begins with support through active listening and the asking of probing questions.

   If you have multiple communication platforms here are a set of factors to consider:

   - Communication turnaround time.
   - Professional Etiquette.
   - How to resolve escalated issues.
   - A retention plan to keep loyal customers.

4. **Be consistent and timely in your interactions:** Customers value consistency. They will not tolerate rudeness, neglect, or failure to deliver on promises.
5. **Engage and connect regularly:** your customers expect it. No one wants to be left out of the loop and contacted when you only have something to sell.

   A gas meter reader should develop a policy in your store that outlines how you will reply to clients (do not use scripts, keep your interactions organic) and how soon/often.

6. Seek feedback and show you genuinely care-customer feedback is critical to your ongoing success because you get to hear directly from your customers about what is and isn't working.

   The first step is to encourage open feedback, via email or through social media. After recording feedback, set up meetings with employees to find out how you can improve. A team that openly discusses ways to enhance products will prevent issues in the future once recommendations are implemented.

7. **Establish trust:** Building trust is about being honest and open, even when it's not a good look.

   In most cases, a customer will be appreciative that you've kept them in the loop. Keeping them in the know builds trust. When in doubt, ask yourself, **"What is the best way to serve our customers?"**

8. Stay genuine-when offering something, do not sound rehearsed. Be true when you say you offer products because you want to help lives. Don't just treat your business like a money-making machine. Do it with passion and you will be rewarded.
9. **Make them feel appreciated:** Find a way to reward your most loyal customers to show them that they are top-of-mind. Develop a loyalty program. Send bags every so often with inexpensive branded items such as pens, stickers, notebooks or notepads, t-shirts, hats, and jackets; anything with your logo on it. Consider first-time customer discounts.

   Think of these incentives as an investment to retain customers. Be creative and remember to give them what they will appreciate.

3.1.8 18 Ways of handling customer for 100% satisfaction

Customer satisfaction: Customer satisfaction (ICSI) is a measure of how well a company's products and services meet customers' expectations. It reflects your business' health by showing how well your products are resonating with buyers.

Here are the following 18 surefire ways that company can drive in customer satisfaction in today's customer-centric landscape:

1. **Create customer service communities:** It is a very crucial point and most of the advanced companies are using this and getting a lot of benefits. The idea behind developing communities is to generate the product ideas and test new products. According to a survey conduct, around 72% of respondents are using communities to obtain feedback on how available products are used; 67% use them to gather ideas for new products or features from customers; and 46% depend on them for feedback on prototypes or beta products.
2. **Provide multi channel support:** With current and quite trendy communications channels such as social, mobile, web chat, and email becoming gradually important to customers, organizations must develop an omni channel method to their customer service in order to connect with customers on the channels they want to use. Multi channel support not only offers customers a smooth and continuous transition between channels; it also prevents them from having to repeat information they may have already given to different call center agents, which can be both irritating to customers and potentially damaging to a organization's reputation.
3. **Make employee satisfaction a priority:** When your employees are happy, they can provide excellent customer service. Studies have proven that employees often perform better at the jobs when they feel appreciated or rewarded. Give each employee a personalized 'thank you' every now and then, and introduce an employee of the month program, if you don't have one already. If you can help your employees take pride in their jobs, their work performance will also enhance.
4. **Turn customer survey data into action:** Good data represents the experiences your customers actually have with your organization. Furthermore, good data equips your organization to take action. The key is to develop a satisfaction survey that analyses truthfully into the heart of your gaps and opportunities.
5. **Figure out what the customer really prefers:** Figure out what the customer really needs, if you can solve the issue they will pay; the value is often not in the discount you can offer but rather in the solution you can support.
6. **Focus on organization culture:** The best organization puts a focus on culture. They execute training programs around their cultural values to ensure everyone shares the same values and that they are consistently manifested when dealing with customers.
7. **Stay current on customer reviews:** In a world that is heavily dependent on the internet, consumers are fast to hop online and share how they feel about a product or service. Take the time to log onto the internet and observe what people are saying about your business. Find out what people enjoy, as well as what they'd like to see better. The reviews you stumble across might amaze you and introduce you to areas of enhancement that you had not previously considered.
8. **Offer a proactive customer service:** The key here is to contact your customers prior they

need to pick up the phone and contact you! The best proactive strategies make steady contact throughout the consumer life cycle. Examples include: payment reminders, fraud monitoring, and personalized loyalty and reward schemes. This strategy can lessen inbound calls and improve agent efficiency. This proves that offering great customer service isn't just good for the consumer, it's good for the business as well.

9. **Personalize:** In everything you do, make sure the customer feels like he or she is the only one that matters. Use the customer's name, refer to personal information and congratulate a customer on his or her birthday. Make them feel at home.
10. **Put a social media plan in place:** Customers are progressively demanding speedy responses—sometimes as swiftly as in real time—to their complaints on social media. A company that isn't paying attention can wreak havoc with its reputation.
11. **Demonstrate product knowledge:** One of the most important aspects of successful customer service whirls around product knowledge. In other words, any and all agents who have direct customer contact should know the organization's product and/or service inside and out.

    In many cases, developing strong product knowledge involves managers helping agents build their confidence so they're motivated to succeed.

12. **Benchmark customer satisfaction:** Benchmarking is the process of comparing your own firm or operations against other firms in your industry or in the broader market area.

    You might compare your most triumphant competitor's customer processes and satisfaction with your own. Or, you might look at a firm outside of your industry known for extraordinary customer service practices.

13. **Set clear expectations and exceed them:** Let customers know up front what your standards, strategies, and practices are. How long will they wait for a reply or a callback? Will that response truly be on target and right? Removing the customers' uncertainty about such common problems in customer service lets them know that a company is dedicated to their success and satisfaction, especially when the business builds in enough leeway that it can routinely exceed expectations.
14. **Study complaints and compliments:** Every message from a customer reflects an opportunity to better customer satisfaction. Compliments show you what to reinforce, while complaints indicate new ideas and action steps for improvement.
15. **Ask how your clients would like to be responded to:** One way to boost customer satisfaction is to communicate with clients through their preferred medium. For online consumers, email is the standard way. This allows them to maintain the anonymous status which is crucial to online consumers. Even when customers provide a telephone number, they may be surprised when you contact them by phone. If you decide to place a call, take into consideration that it is a more personal and perhaps intrusive action.
16. **Provide additional benefits:** Surprising your customers with a free hamper or goodie suddenly can go a long way in building concrete relationships. Sometimes, an unanticipated discount on the products your consumers have been looking/wanting for some time can work. On other events, you can consider throwing in an additional accessory or a week's worth post-purchase support for free.

17. **Ask for more feedback:** Ask questions from customers, so that you would get insights about your service or product. This can be done through various methods either choose an online medium or offline one. Prepare a questionnaire and the questions should be framed such that you can infer what are your strengths, qualities, or weaknesses or what you need to improve.
18. **Empower your agents:** Agents who have been carefully hired and rightly trained then they need the authority to handle customer problems before they need upsurge. No customer really demands to have to ask to speak to a supervisor; they want to be talking to someone who can solve the issue in the first place. Giving your reps the power to make their own decisions makes your consumers happy, and it also keeps your reps content, minimizing agent turnover. More operational cost savings!

3.1.9 Safety tips, fire safety precautions while using piped natural gas, maintenance, response to gas emergencies

In case of gas leakage at workplace/house

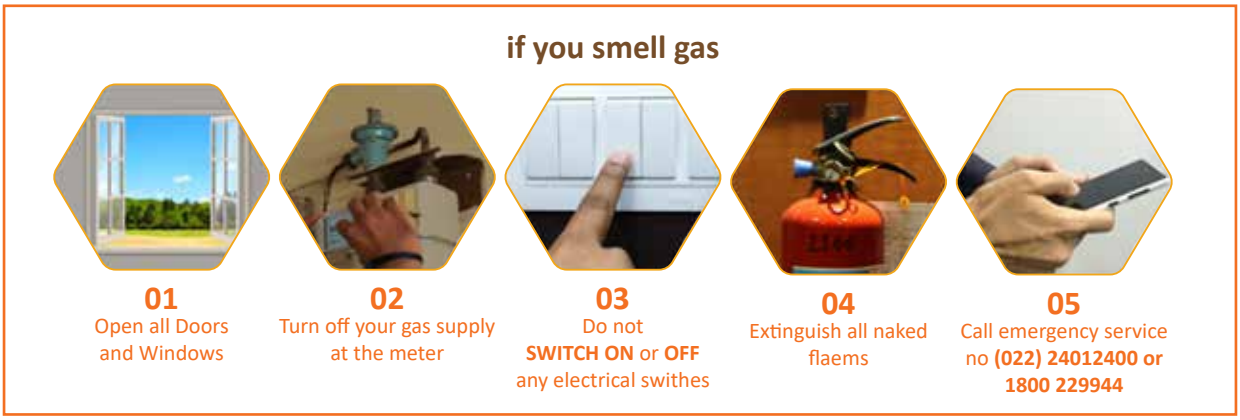

Fig: 3.1.3 In case of gas leakage follow steps

Do's

- Before you turn on your gas stove, make it a habit to open all doors and windows for proper ventilation. Since gas is lighter than air, it would disperse immediately in case of any gas leakage. This will help prevent any incidents of fire or explosions.
- In case you smell any leakage, close the main control valve and inform IOAGPL instantly.
- If the leakage is noticed in the yellow PE (poly-ethylene) line, inform the company right away and do not permit any vehicles near the leakage point.
- Inform the company for any digging/ construction work on a gas line by you or third party near or around your house.
- Always close your gas tap before you go to bed at night.
- For any changes in your gas pipeline, always ensure an authoritative person makes the changes.
- Never use non-standard unauthorized tubes; always go for rubber tubes supplied/ certified by the gas company.

- Always ensure your rubber hose is rightly fit.
- Inform the customer care cell if subsequent meter reading comes.
- Last reading of your meter shows nil consumption. Kindly contact our customer care if gas is used, so that faulty meter can be replaced.

Dont's

- In case you sense/smell a gas leakage, do not switch on any electrical switches and appliances.
- Do not smoke or ignite candle lamps etc. In case of any leakage.
- Stop cooking immediately if you smell a gas leakage.
- Do not carry-out or permit any digging and alteration/construction on gas lines. If needed, inform IOAGPL about it.
- Do not permit any flame, spark or smoking near the leakage point/area.
- Never carry out any changes by yourself and never tamper with any fittings of gas connection.

Safety tips against gas leakage

- Please check your rubber tube for crack, damage and replace it with quality and safer rubber tube.
- Make it a habit to keep the appliance valve (connecting gas supply through rubber tube) closed after use.
- Meter control valve to be turned off if your house is to remain closed for more than a day.
- In case of leakage, don't switch on/off any electrical switch/appliance & for ventilation open doors & windows.
- Do not fiddle with PNG pipeline or fittings and for any repairs or modifications do not call local plumber or mechanic.
- Always call PNG control room for any help.
- Always inform PNG control room prior to any construction and modification in civil structure at your home/workplace.
- Always inform PNG control room if you find any third party digging work in progress nearby PNG pipeline coming to your home/workplace.
- Do not permit any naked flames (firecrackers, lighting garbage on fire, etc.) Near any PNG pipeline.
- Last but not the least, check whether PNG pipe is concealed / covered under cupboard in your kitchen or where the connection has been maintained, if yes, please get it in open, else leaked gas if any, may accumulate & pose danger.

Fire safety precautions while using PNG:

The precautions that need to be observed are almost the same to that of LPG. Here are the points that you should retain in mind while using a piped natural gas.

1. **Ventilation:** Before using PNG, make sure the room/area of the workplace has enough ventilation. Open the doors and windows, so that in case of any leakage, the gas would disperse in a speedy way.
2. **Leakage:** A distinctive odour is added to the gas for simple identification. Also, if there is a hissing

sound near a pipeline, it may detect leaking natural gas.

If there is a leakage, close the valve that supplies gas to your stove and seek the help of your gas supplier. Do not light a match or a lighter or any naked flame. Do not move on electrical appliances or turn off or turn on an electrical appliance.

If you are going away for a long time, close all the valves that supply gas. This avoids accumulation of gas in your house/workplace in your absence.

3. **Digging:** Unlike LPG, PNG is supplied through underground gas lines that run to your house. So, in case any digging work is taking place around your workplace/home, inform the gas company instantly. If you suspect any potential damage or defect to the gas line, call the gas supplier right away.
4. **Asphyxiation:** Prolonged exposure to natural gas may cause carbon mono-oxide poisoning and eventually death by asphyxiation. If there is a yellow, large and unsteady flame in your gas burner or if there is a pungent odour when you are using the gas, then there could be the existence of carbon monoxide. In such cases, contact your gas supplier immediately. It is also recommended to install carbon monoxide indicators in your kitchen or where you have installed your connection.

Maintenance:

Maintenance plays a vital role in preventing accidents due to leakage and exposure to carbon monoxide.

1. Get your gas appliances checked regularly by a qualified and certified technician from the certified and licensed gas company.
2. If there is any damage or repair to the gas appliances, have this checked only by the certified technician.
3. Do not store or use any flammable products in the same room near the PNG. Such as, LPG, paints, spray repellents, varnish, paints, cleaning products, etc. This will help in preventing any accidental ignition.
4. If there is a yellow, large and unsteady flame, call the gas company instantly.
5. Never use PNG and LPG in the same place.

Response to gas emergencies

- Without getting afraid immediately notify the utility company.
- Isolate and try to remove potential ignition sources.
- Ventilate the area by opening all doors, windows and vents if possible.
- Try to calm the customer and ask them to evacuate the area and check that the customer is safe and not freaked out too.

3.1.10. Why do customers complain?

Customer complaints

Customer complaints are the expression of a customer's feeling of discontent towards product or service or business. Usually customer complaints arise when there are gaps between what was promised and what is provided to the customers. All customers are bound to have expectations and viewpoints about your business, and they have every right to file a complaint when you fail to meet those conjectures.

Why do customers complain?

No matter how good your product or service is, no organization is perfect. Mistakes happen and at some point, it's inescapable that you'll get customer complaints.

It is significant to deal with customer complaints rapidly and effectively. When customers have poor and bad experiences with your business, they'll tell other people about them. The reach of this negative opinion can publicize further than ever now that customers can quickly communicate with many people via social media and other digital channels. In today's hyper-connected world, avoiding customer complaints isn't an option.

Only 4% of discontent customers actually voice/ file their complaints, so when they do, it's a rare opportunity to make things right, win your customer back, and stop negative word-of-mouth. On top of that, while many companies will pay for focus groups, surveys, and other forms of research to find opportunities to rectify mistakes, customers are freely providing up their insights in the form of complaints. Customer complaints are important information to help you improve your business.

Most common customer complaints

1. **Product-related complaints:** These complaints are related to the products that have poor quality, expensive, and missing features. In these types of complaints, the customers should be asked to hand over the product or provide a detailed explanation of what went wrong with the product.
2. **Service-related complaints:** These are complaints associated with customer service involving long wait time, higher response and resolution time, problems with the support agents delivery, shipment and refund problem, and bad user experience.
3. **Complaints raised due to misunderstanding:** These complaints arise when there is misunderstanding between both parties. The customers might misinterpret any information and bring forward a complaint. It is important here to not lose temper and the customer should be treated with respect even though he/she is misinterpreted.

   How can you track, monitor, and categorize customer complaints.

Tracking

One way to display customer complaints is simple: Ask customers what they think. You can request them right at the point of sale, send surveys, or make follow-up calls. The one constant here is to make it easy for customers to share with you.

If there are a lot of steps needed to register a complaint, like a complicated feedback form, long ivr phone tree, or horrible wait times for your live chat or call centre, then customers will be far less likely to share their complaints with you. Remove any unnecessary barriers for registering complaints and make getting

in touch with you an uncomplicated experience. Customers don't want to jump through hoops to reach you, especially when they're already annoyed.

When you make it easy, you'll get complaints directly, and often privately, instead of openly and on channels that you don't control. That said, there will still be times when customers don't complain to you directly, so you need to be energetic about finding complaints.

Be sure to frequent all the places where your business has a public existence or is discussed by your customer group. When you see a complaint, identify yourself as an employee of your organization and ask the customer if you can help solve their issue.

As mentioned, you may see or find complaints on social media. Some of those will be posted directly to your social media pages. Other times, customers may complain about you without mentioning you directly. Monitor hashtags on social media and use keyword searches to help you find these complaints, then use your organization's social media channels to reach out with an offer to help.

Tracking and categorizing

As when you receive complaints, you'll categorize and track them so you know the things that have gone wrong in your business and work to make sure those things don't happen again to other customers.

The first step is viewing enough individual complaints to start seeing these trends. Once you've noticed some, you can prepare a list. Then, as new complaints come in, you can reference the list and categorize them using software.

As you categorize your complaints, you'll be creating a lot of data about what consumers complain the most. Review this data on a everyday basis to find/discover opportunities to boost your consumer experience and prevent future complaints.

Reviewing data on a regular basis ensure you always keep a pulse on what's crucial to your consumers, even as your business and their expectations change.

You'll also be able to evaluate the impact on improvements that you execute. As you take steps to fix a problem that causes complaints, you should see complaints about that specific problem decrease. If you do, then you know you're on the right track. But if you don't, then you'll know that you may require to try another way.

Handle the customer complaints

At some stage your business is likely to get a customer complaint. Dealing with it in a positive and constructive manner will assist you to keep your customers.

In general, customers who are dissatisfied with your product or service will not complain to you – but they will complain to others(negative word-of-mouth) and take their business elsewhere. Managing customer complaints and resolving them speedily will result in better business processes and repeat business.

Before, you move on to handling the customers, first create a procedure for handling complaints. Here are some steps that will tell you how to handle customer complaints easily and smoothly.

1. **First listen!:** Firstly, thank your customer for bringing up the matter to your attention. Then, apologise and accept your mistake, don't blame others and remain polite and cool.

2. **Record details of complaints:** Ask your customers what are their problems and go into each detail of the complaint and find out what exactly the problem is. Keep all the records in a centralized way either on a software or recording somewhere else. This will aid you in identifying any trends and issues.
3. **Get all the facts!:** Review that you have understood all the necessary complaints and recorded it in a proper manner.
4. **Discuss options for fixing problems:** Ask your customers what response they are actually seeking for- either for repair, refund, replacement or apology. Decide if requests are considerable.
5. **Act quickly:** Aim to resolve the complaint in a speedy manner. If you take a long time they tend to grow.
6. **Keep your promises:** Never ever do false promises to your customers. Keep customers updated if there are any delays in resolving requests
7. **Follow-up:** Contact the customer to find out if they were satisfied with how their complaint was handled or managed. Let them know what you are doing to prevent the problem in the near future. Make sure your staff are well-trained to follow your strategies and procedures when handling complaints/issues and that they have the power to resolve issues as fast as possible. Encourage your consumers to provide feedback and complaints so that they let you know when there is a problem and provide you the opportunity to resolve it.

Exercise

Choose one option amongst the following and complete the sentence.

1. **Sender is also known as.....?**
   a) Receiver
   b) Channel
   c) Source
   d) Decoder

2. **..... is a necessary and foremost thing to do when you sense gas leakage at your workplace/home?**
   a) Open all the doors for the proper ventilation
   b) Turn off gas supply
   c) Do not switch on switch off any electrical switches
   d) Call on emergency service number

3. **Tick the True or False in the following statement**

   "Social Media is an important medium to handle the customer problems" (True/False)

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The art of effective communication

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https://youtu.be/-BdbiZcNBXg

Being a good listener

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https://youtu.be/_2rSsu84F50

Formal and informal greetings in English

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Building rapport: customer service

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5 steps to improve customer satisfaction

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What to do when you smell gas leak

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Dealing with customers training

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https://youtu.be/WphIXqTp_es

Handling customer complaints: defusing frustration

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4. Working effectively in a team

Unit 4.1 - Effective communication, feedback, and listening

HYC/N9301

Key Learning Outcomes

At the end of this Module, the participant will be able to:

1. Describe the ways of communicating clearly with the supervisor and reporting authorities.
2. Explain how to work with colleagues and other members of the organisations.
3. Explain how to exchange information in line with organisational requirements.
4. Identify issues of interpersonal conflict at workplace.
5. Explain the organisation's policies and procedures.
6. Demonstrate the ways/methods to resolve the issues while working in a team.
7. Demonstrate the methods to complete the assigned task successfully in a team.

Unit 4.1 - Effective communication, feedback, and listening

Unit Objectives

At the end of this unit, the participant will be able to:

1. Describe the meaning and need of team work.
2. Comprehend the meaning and differences between permanent and temporary teams.
3. Understand the roles of a team members.
4. Explain the several types of skills to perform well in a team.
5. Define the meaning and need of personal and interpersonal skills require in a workplace.
6. Understand the important areas that are need to be addressed in building a team.
7. Enlist and self analyse the interpersonal skills that require in a team.
8. Describe the organization skills that are required at a workplace.
9. Identify the ground rules for the team to operate to achieve the goals of the team.
10. Describe and conduct the coordination of a task in a team.
11. Perform the internal and external type of communication.
12. Understand the meaning of team conflicts and types of team conflicts that occur at workplace.
13. Understand and demonstrate the conflict management skills require at workplace.

4.1.1 Team work

Why do we need a team?

The main purpose of forming a team is that the achievement of a team can be much higher than the sum of achievements of the individual members.

Fig: 4.1.1 Team Work

A team is formed specifically for achievement of some objectives, whereas a group may get formed without any purpose or even by accident. There are fundamental differences between a group and a team.

- A team has to function as one unit and deliver the stated objectives.
- Individual members of a team have to work towards the common shared objectives of the team; they cannot pursue their individual goals if it clashes with the team objectives.
- They have to follow the team's norms of behaviour, its methodology and procedures.
- They have to communicate with each other and outsiders in a predefined manner.
- Reporting and evaluation of each team member's contribution will be done at regular intervals.

All these do not mean that there is no scope for individual creativity in a team. In fact the opposite is true. In a balanced team there are specific roles to be performed by different members and these include creativity, exploration and research.

An individual member of a team needs to perform predetermined tasks in a team. Each member of the team needs to know the roles they are expected to perform and the tasks that are their responsibility. They may also be required to take care of situations that are not part of the script and use their initiative and contribution to get the team running smoothly.

A team will achieve the stated objectives and go beyond only when inter-relationships within the team are well understood and accepted by all the members. Interpersonal clashes and political infighting may be present for a short while but the team must have effective mechanisms to resolve these and get on with the job on hand

4.1.2 permanent and temporary teams

Teams are of two types in terms of their life span. Some are temporary and others are permanent.

The difference is that the life span of a temporary is defined and short. On achievement of the team objectives, or failure to do so, a temporary team will be disbanded. A permanent team, on the other hand, has a relatively longer life and the end point is not pre-defined. Objectives of a permanent team are reviewed at regular intervals and may get overhauled occasionally. These teams mostly handle activities that are routine, predictable and repetitive in nature. Temporary teams handle activities that are one-time in nature. Examples of permanent teams in work life are sales & distribution, accounts, production etc. Examples of temporary teams are market expansion, product launch, product development etc.

Each person has a natural tendency to fit into one type of team or the other. Once a person knows this, she can prepare herself better to work in any given situation rather than wonder why she is not as good in certain activities as some other people. For building a team, it is important to identify the inherent reasons for this preference and create teams accordingly to improve the probability of success

4.1.3 Team roles

An individual member of a team needs to know his position and role in the team and the tasks that are his responsibility.

Each member of a team has some strengths and weaknesses. The team has to focus on these to create an appropriate structure to achieve the team objectives.

There are people who are more suited to one type of team as against another type. It is important to identify the inherent reasons for this preference and create teams accordingly to improve the probability of success.

A team will achieve the stated objectives only when relationships within the team are well understood and accepted by all the members.

So, it is important that a team is well balanced, not only in terms of technical skills but also in terms of personalities and interpersonal relationships. This does not happen by chance. One cannot put five great people together in a room and expect that the group will work as a team. For a team to function effectively and achieve its objectives with minimum of fuss, the members have to be chosen properly.

4.1.4 Team working skills

Members require several types of skills to perform well in a team. These may be grouped under personal, interpersonal and organizational skills. Personal skills are those inherent abilities that help do one's own work efficiently, like time management, task scheduling & prioritisation. Interpersonal skills are required to interact with others within the team and outside with the minimum amount of conflict.

Organizational skills make a person work effectively within the team by following organizational norms and structures. All skills can be learn and developed over time and may be needed in differing strengths according to the task at hand.

What are your personal skills?

Personal skills are those that enable a person to perform his own tasks. Every person needs to know what he is good at and identify those roles in the team that suits his competencies. He needs to discuss these in such a way that most of the time he works in his area of strength and not in his area of weakness. However, no one has all the capabilities required to perform all the roles that one will come across in the work life. He needs to acquire skills that are required for the present role and deploy those effectively. He has to meet the expectations from his role and fulfil his responsibilities. He has to complete his tasks on time and within the quality parameters. Time management is an important aspect of personal skill. Ability to set priorities and follow them is also important if an individual has to deliver according to the team's overall time frame and schedule.

Every situation in work life may not come with a predefined approach. Problems look for solutions, some well known and some to be developed. An individual needs to have the capability to think out of the box when faced with an unknown situation. Creative ways of problem solving adds value to a person in any given organization.

What interpersonal skills do you have?

The need for interpersonal activity comes out clearly when people are involved in some intense group activity. The group that gels as a team in a competitive situation is more likely to come out on top. Even with limited resources, teams have won contests or succeeded beyond expectations when members of the team have worked together. One of the key ingredients for a team to work well is good interpersonal skills of the members.

Actively listening to others is a good starting point for effective interpersonal relationship building. This includes not only hearing and comprehending but also responding appropriately so that the other person knows that his communication has been received and (will be) acted upon. It is necessary to seek clarification when something is not clear, instead of assuming something that may not be correct.

Responding appropriately when spoken to is vital to create and build relationships within a team, even if the topic is of no apparent importance. Use of racist, derogatory, sarcastic or satirical language does not add value to relationships.

Articulating one's own thought correctly, completely and clearly is also an important interpersonal skill. One should speak when required but not hog a conversation to the discomfort of others present. At times just polite conversation is also relevant when people are waiting for something to happen. At times use of non-verbal communication can be more effective than spoken words.

Providing feedback to others is an important skill. The language and tone of the feedback should be appropriate to the purpose of feedback i.e. To enable the other person to make corrections and it should sound neither degrading nor patronising. The person receiving the feedback should be able to accept the feedback with ease and grace.

4.1.5 The power of teamwork

Working in a team means that every member will have to collaborate with all other members of the team. This is to be achieved in spite of many differences in opinion, taste, likes and dislikes, religion, language and so on. The objective of the team is above all the guiding lamp while members are part of the team.

Other important areas to be addressed in building teams are:

- The communication process and issues related to poor communications
- Building trust among team members
- Interpreting and using non-verbal communication
- Virtues such as patience and humour in dealing with team members

Given below is a list of interpersonal skills.

Please follow the steps explained below to evaluate yourself and find out areas that require improvement. Assess yourself and put a tick in the box that fits you best today. If you consider the skill/characteristic essential for team-working, put **"y"** in the last column. Identify the areas which you consider essential and in which you would like to make a change.

Interpersonal Skills: Self Analysis	Always Often	Seldom Never Essential?
Get clarification from the speaker when I do not understand what is being said		
I convey my feelings towards others even if I am not speaking		
I avoid making fun of a team member in front of others		
I interrupt the speaker when I do not agree with what is being said		
I cross examine in depth to find out the truth		
I dominate a conversation when I am in a position of strength		
I use company jargon in meetings		
I make sure that my comments are not racist or gender biased		
I speak when I have something to say		
I give importance to body language irrespective of what is being said		
I avoid speaking when I have nothing to say		
Respond when I am asked a question		

Table: 4.1.1 Interpersonal skills: self analysis

4.1.6 Organizational skills

Most organizations have a set of processes and methods to achieve their objectives. Vision & mission statements, quality policy, project and quality plan templates, standard reporting formats are all documents that employees are required to interpret, follow and execute on a regular basis. Many organizations have quality initiatives like ISO which mandate that various processes are documented and followed. Project driven organizations have project plan templates that are used to create plan for every new project. There are rules, norms, precedence and other guidelines that are followed in an organization and dictate expected behaviour.

An organization may have well defined communication processes that make the flow of information smooth and error-free. Employees and team members need to appreciate these and follow to enhance

working relationships for optimum delivery and growth.

Ground rules: agreed upon ways for the team to operate and the members to follow-goals and expectations

Each member should complete his tasks on time for the team to achieve its objectives. If members do not perform as per expectation, there will be tension in the team.

- How will the tasks be performed?
- Who will do what?
- What are the deadlines and who controls these?
- When and how will the review take place?
- Corrective action if someone fails to deliver on time / as per quality?
- Each member has his own way of working. If two (or more) people have to work together on a task, whose way will be followed?
- Who will decide on the quality standard of each output?

How will the tasks be coordinated?

- Does the team require a coordinator?
- What is the methodology for choosing the coordinator? Will this position be rotated?
- What are the responsibilities of the coordinator?

How will communication take place within the team and with the outside world?

- In a team there are several members. There will be formal and informal communication between each pair of members, individually or in a group. Some people prefer to communicate through e-mail while others would rather talk on the phone.
- Will minutes of every meeting be posted to everyone?
- Which are the reports to be generated? Who will receive copies of which report?
- Who should be informed when an activity is completed?
- How will approaching deadlines be communicated?
- Will there be any central archive of all documents related to the project? What will be the access rules?

Where, when, how of meetings

- Which are the formal meetings required? Who will attend which meeting?
- At what frequency will each type of meeting be held?
- What will be the agenda for each type of meeting? Who will frame the agenda?
- Who will coordinate which meeting? The venue & time for meetings
- How to handle late comers? How to handle people who habitually miss meetings?

Behaviour and feelings

- What is the level of formality / informality expected of others? Dress? Habits (eating/smoking)?
- How to handle discussion hoggers?

- How to handle member's unhappiness about team performance / process / coordinator & other members?

What is team conflict

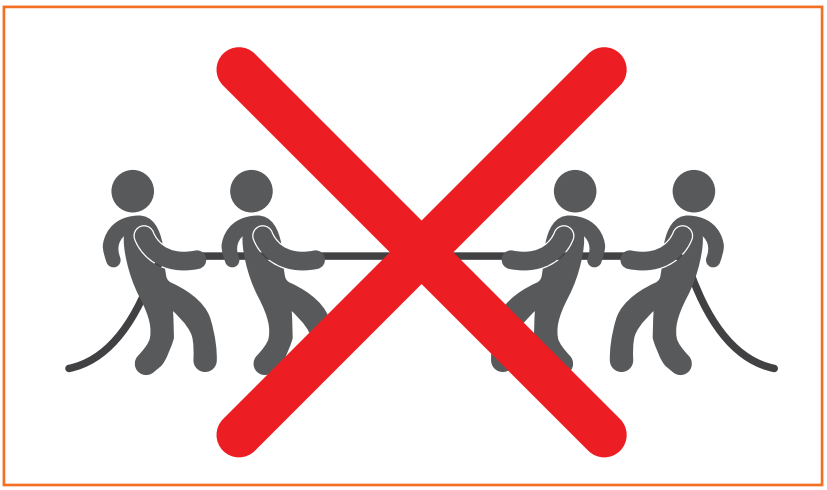

Fig: 4.1.2 Conflict team work

Teams comprise people with unique attitudes, backgrounds, experiences and agendas. It is obvious that differences of opinions of these members working together can often lead to conflicts. Conflicts are natural yet often harmful for a team's effectiveness if not managed rightly. In fact withstanding the conflict and resolving the disagreement is one of the most important skills of a team.

Types of conflict

Conflict can be divided into two major categories: one that is related to people, principles or feelings and the other that is related to dreams and ideas, issues or procedures. Some of the reasons for conflict are:

- Character and personality of team members.
- Their principles and values.
- Their attitudes.
- Functions and responsibilities of each team member.
- The process of setting goals and the means to achieve it.
- Communication and interaction between team members.
- Interdependence.
- Inadequate resources.

Conflicts can at times have positive outcomes…

- There is personal growth in the team members.
- A solution can be arrived at.
- There is more interaction between team members.
- It causes bonding between members.

The possible negative outcomes of a conflict could be…

- The problem continues without any solution
- Priority is shifted from more important issues
- Team members are demoralized
- There is division in team

Whatever be the conflict and in whatever situation every organization should prepare its members to handle such conflicts in order to bring about the synergistic benefits to the team.

Conflict management skills

No teamwork is complete without its fair share of trouble. All the positive personal and interpersonal skills lose their value if there are situations or people that become obstructions for others to function.

There could be conflicts that are inherent in the way the team has been formed. For instance, some teams are formed of people having different points of view on issues with the objective of keeping checks and balances in the team. Conflicts also arise when members who have joined the team at different points in time come with their own points of view and over time these differences accumulate.

There may be conflicts on purely personal likes and dislikes of members. Every member cannot and need not like everyone else in the team. At times individual differences lead to interpersonal conflicts which may disrupt the team functioning.

An effective member of a team needs to know how to face these situations since these may arise at any time, and without much provocation. One of the time-tested methods for reducing conflict is to continually focus on the team objective and the behavioural problem rather than the person exhibiting it – focus on the behaviour and its effect, not on the person.

Exercise

Choose one option amongst the following and complete the sentence.

1. We can never separate our personal "……" from our professional "……".
   a) Dignity b) Attitude
   (c) Traits d) Self
2. "People respond to stimuli in the environment in…….. ways."
   a) Similar b) Very different
   c) Awkward d) Strange
3. "Nonverbal cues can differ dramatically from …… to ……"
   a) Culture b) Area
   c) City d) Country
4. **Complete the sentence:**
   Conflict can be divided .....

.....

.....

5. **State True and False**

"At times individual differences lead to interpersonal conflicts which may resolve the team functioning." ☐ True ☐ False

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https://youtu.be/6fbE52YDEjU
Team work can make the dream work

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https://youtu.be/fUXdrl9ch_Q
Good Teamwork and Bad Teamwork

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https://youtu.be/9MO1aY1xC80
Motivation - leader and teamwork!

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https://youtu.be/EDMY39JE1sY
5 steps to manage conflict between team members

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https://youtu.be/H_vOfqIpD60
Why team building is important

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https://youtu.be/WTa4wvFVX_Y
How to manage conflict in a team

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5. Maintain health, safety and security procedures

Unit 5.1 - Maintain health, safety and security procedures

HYC/N9302

Key Learning Outcomes

At the end of this Module, the participant will be able to:

1. Explain the use of protective clothing and equipment for different work conditions and environment.
2. State the risk associated with handling various tools used in meter reading.
3. Describe the ways to check gas pipelines at consumer site.
4. Identify the possible cause of risk or accident at consumer site.
5. Describe safe work practices in difficult areas.
6. Demonstrate rescue techniques during hazard.
7. Explain health and safety precaution while capturing meter reading under hazardous condition.
8. Discuss the threats that may arise out of mishandling of equipment in use with piped natural gas.
9. Explain how to handle and respond to the leakage of natural gas explain how to respond promptly and appropriately to an accident.
10. Demonstrate how to administer first aid to victims in case of emergencies.

Unit 5.1 - Maintain health, safety and security procedures

Unit Objectives

At the end of this unit, the participant will be able to:

1. Describe the meaning of hazards and risk involved at a workplace.
2. Identify the meaning of occupational health and safety that need at a workplace.
3. Assess the poor working conditions that affect workers/employees health and safety.
4. Describe the importance of occupational health and safety.
5. Evaluate and understand the cost of occupational injury/disease.
6. Describe the effective workplace health and safety programmers.
7. State the conduct various techniques of using different fir extinguisher at a workplace.
8. Identify the need of personal protective equipments that require by a gas meter reader at a workplace.
9. List down the five basic types of eye and face protection that are required for a gas meter reader.
10. Recall the key takeaway for protective clothing and gears.
11. Evaluate the different methods and classes of extinguisher fires.
12. Explain the use of fire extinguisher at a workplace.
13. Identify the different materials used for extinguishing fire and their usage.
14. Understand and perform the rescue techniques applied during a fire hazard.
15. Identify and list the various types of safety signs with their meaning and importance.
16. Tell an appropriate and basic first aid treatment relevant to the condition against any injury at a workplace.
17. Enlist important pointers to inform fire safety department about near-miss incidents in the workplace.
18. Elaborate the steps to write an incident report.

5.1.1 Meaning of "Hazards" and "Risks"

Hazard

A hazard is an agent which has the potential to cause harm to a vulnerable target. The terms **"hazard"** and **"risk"** are often used interchangeably. However, in terms of risk assessment, these are two very distinct terms. A hazard is any agent that can cause harm or damage to humans, property, or the environment. Risk is defined as the probability that exposure to a hazard will lead to a negative consequence, or more simply, a hazard poses no risk if there is no exposure to that hazard.

Hazards can be dormant or potential, with only a theoretical probability of harm. An event that is caused by interaction with a hazard is called an incident. The likely severity of the undesirable consequences of

an incident associated with a hazard, combined with the probability of this occurring, constitute the associated risk. If there is no possibility of a hazard contributing towards an incident, there is no risk.

Fig: 5.1.1 Hazard and Risk meaning

Hazards can be classified as different types in several ways. One of these ways is by specifying the origin of the hazard. One key concept in identifying a hazard is the presence of stored energy that, when released, can cause damage. Stored energy can occur in many forms: chemical, mechanical, thermal, radioactive, electrical, etc. Another class of hazard does not involve release of stored energy; rather it involves the presence of hazardous situations. Examples include confined or limited egress spaces, oxygen-depleted atmospheres, awkward positions, repetitive motions, low-hanging or protruding objects, etc. Hazards may also be classified as natural, anthropogenic, or technological. They may also be classified as health or safety hazards, by the populations that may be affected, and the severity of the associated risk. In most cases a hazard may affect a range of targets, and have little or no effect on others.

Identification of hazards assumes that the potential targets are defined, and is the first step in performing a risk assessment.

Risk

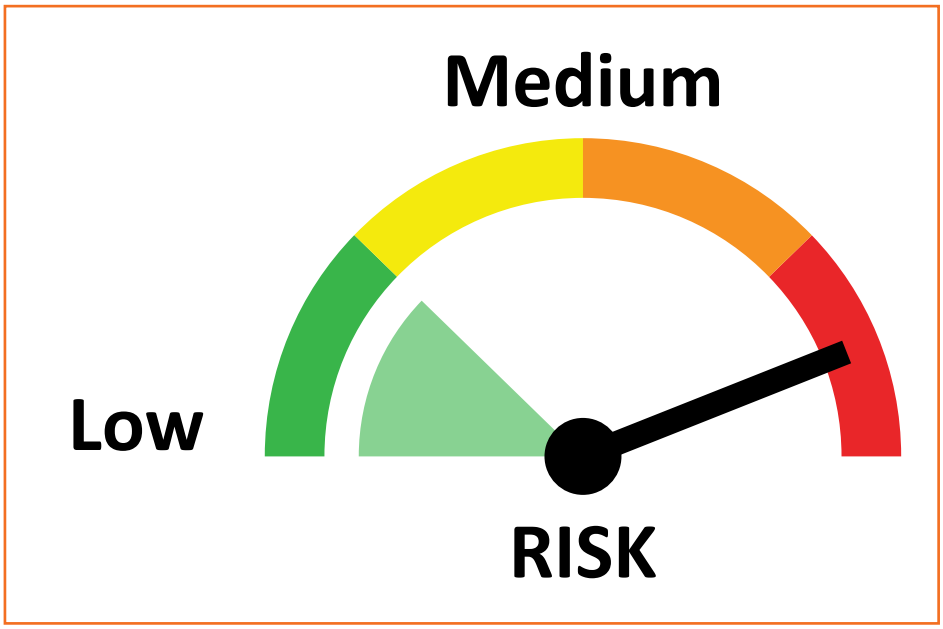


Fig: 5.1.2 Low and medium risk

Risk is the potential of gaining or losing something of value. Values (such as physical health, social status, emotional well-being, or financial wealth) can be gained or lost when taking risk resulting from a given action or inaction, foreseen or unforeseen (planned or not planned). Risk can also be defined as the intentional interaction with uncertainty. Uncertainty is a potential, unpredictable, and uncontrollable outcome; risk is a consequence of action taken in spite of uncertainty.

Risk perception is the subjective judgment people make about the severity and probability of a risk, and may vary person to person. Any human endeavour carries some risk, but some are much riskier than others.

5.1.2 Health and safety hazards commonly present in the work environment and related precautions

Occupational health and safety is a discipline with a broad scope involving many specialized fields. In its broadest sense, it should aim at:

The promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations

- The promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations
- The prevention among workers of adverse effects on health caused by their working conditions;
- The protection of workers in their employment from risks resulting from factors adverse to health;
- The placing and maintenance of workers in an occupational environment adapted to physical and mental needs;
- The adaptation of work to humans.

In other words, occupational health and safety encompasses the social, mental and physical well-being of workers that is the **"whole person"**.

Successful occupational health and safety practice requires the collaboration and participation of both employers and workers in health and safety programmers, and involves the consideration of issues relating to occupational medicine, industrial hygiene, toxicology, education, engineering safety, ergonomics, psychology, etc.

Occupational health issues are often given less attention than occupational safety issues because the former are generally more difficult to confront. However, when health is addressed, so is safety, because a healthy workplace is by definition also a safe workplace. The converse, though, may not be true - a so-called safe workplace is not necessarily also a healthy workplace. The important point is that issues of both health and safety must be addressed in every workplace. By and large, the definition of occupational health and safety given above encompasses both health and safety in their broadest contexts.

Poor working conditions affect worker health and safety

- Poor working conditions of any type have the potential to affect a worker's health and safety.

- Unhealthy or unsafe working conditions are not limited to factories — they can be found anywhere, whether the workplace is indoors or outdoors. For many workers, such as agricultural workers or miners, the workplace is **"outdoors"** and can pose many health and safety hazards.
- Poor working conditions can also affect the environment workers live in, since the working and living environments are the same for many workers. This means that occupational hazards can have harmful effects on workers, their families, and other people in the community, as well as on the physical environment around the workplace. A classic example is the use of pesticides in agricultural work. Workers can be exposed to toxic chemicals in a number of ways when spraying pesticides: they can inhale the chemicals during and after spraying, the chemicals can be absorbed through the skin, and the workers can ingest the chemicals if they eat, drink, or smoke without first washing their hands, or if drinking water has become contaminated with the chemicals. The workers' families can also be exposed in a number of ways: they can inhale the pesticides which may linger in the air, they can drink contaminated water, or they can be exposed to residues which may be on the worker's clothes. Other people in the community can all be exposed in the same ways as well. When the chemicals get absorbed into the soil or leach into groundwater supplies, the adverse effects on the natural environment can be permanent.

Overall, efforts in occupational health and safety must aim to prevent industrial accidents and diseases, and at the same time recognize the connection between worker health and safety, the workplace, and the environment outside the workplace.

Why is occupational health and safety important?

Work plays a central role in people's lives, since most workers spend at least eight hours a day in the workplace, whether it is on a plantation, in an office, factory, etc. Therefore, work environments should be safe and healthy. Yet this is not the case for many workers. Every day workers all over the world are faced with a multitude of health hazards, such as:

- Dusts
- Gases
- Noise
- Vibration
- Extreme temperatures

Unfortunately some employers assume little responsibility for the protection of workers' health and safety. In fact, some employers do not even know that they have the moral and often legal responsibility to protect workers. As a result of the hazards and a lack of attention given to health and safety, work-related accidents and diseases are common in all parts of the world.

5.1.3 Costs of occupational injury/disease

Work-related accidents or diseases are very costly and can have many serious direct and indirect effects on the lives of workers and their families. For workers some of the direct costs of an injury or illness are:

- The pain and suffering of the injury or illness.
- The loss of income.
- The possible loss of a job.
- Health-care costs.

It has been estimated that the indirect costs of an accident or illness can be four to ten times greater than the direct costs, or even more. An occupational illness or accident can have so many indirect costs to workers that it is often difficult to measure them. One of the most obvious indirect costs is the human suffering caused to workers› families, which cannot be compensated with money.

The costs to employers of occupational accidents or illnesses are also estimated to be enormous. For a small business, the cost of even one accident can be a financial disaster. For employers, some of the direct costs are:

- Payment for work not performed.
- Medical and compensation payments.
- Repair or replacement of damaged machinery and equipment.
- Reduction or a temporary halt in production.
- Possible reduction in the quality of work.
- Negative effect on morale in other workers.

Some of the indirect costs for employers are:

- The injured/ill worker has to be replaced.
- A new worker has to be trained and given time to adjust.
- It takes time before the new worker is producing at the rate of the original worker.
- Time must be devoted to obligatory investigations, to the writing of reports and filling out of forms
- Accidents often arouse the concern of fellow workers and influence labour relations in a negative way.
- Poor health and safety conditions in the workplace can also result in poor public relations.

Overall, the costs of most work-related accidents or illnesses to workers and their families and to employers are very high.

On a national scale, the estimated costs of occupational accidents and illnesses can be as high as three to four per cent of a country’s gross national product. In reality, no one really knows the total costs of work-related accidents or diseases because there are a multitude of indirect costs which are difficult to measure besides the more obvious direct costs.

5.1.4 Health and safety programmers

For all of the reasons given above, it is crucial that employers, workers and unions are committed to health and safety and that:

- Workplace hazards are controlled - at the source whenever possible.
- Records of any exposure are maintained for many years.
- Both workers and employers are informed about health and safety risks in the workplace.
- There is an active and effective health and safety committee that includes both workers and management.
- Worker health and safety efforts are ongoing.

Effective workplace health and safety programmers can help to save the lives of workers by reducing hazards and their consequences. Health and safety programmers also have positive effects on both worker morale and productivity, which are important benefits. At the same time, effective programmers can save employers a great deal of money.

5.1.5 Techniques of using the different fire extinguishers

Fires can cause a huge amount of danger and irreversible damage to people and buildings. People need to be vigilant about fire safety in order to prevent a fire from happening, and also know the correct actions to take when a fire occurs.

Employees should receive fire safety training in order to understand how to minimize the risk of a fire in their workplace environment. The key parts of fire safety include: recognizing fire hazards, how to safely escape from a building and understanding how to use fire extinguishers.

We have created a guide to fire extinguishers and how they should be used correctly to control different fire types.

Types of fire

There are Six fire classifications, and all the 6 warrants concise understanding of their safety standards. It is wise and logical to use the most efficient and effective fire extinguisher.

Below are the fire-classifications as per their content:

- **Class A Fire:** Contains composition of solid materials like the wood, paper, textiles or straw.
- **Class B Fire:** Is in flammable fluid state consisting paint, petrol or diesel.
- **Class C Fire:** Is in gaseous state comprising flammable gases like propane and methane.
- **Class D Fire:** Is in flammable metallic state having constituents, titanium & magnesium.
- **Class E Fire:** Represents electrical sparks which takes in form fire. Location it happens in fuse boxes, computers and other electric and electronic components.
- **Class F Fire:** Caused usually in residential & commercial kitchens and the facilitators of such fires are cooking oils, deep fat-fryers.

Which fire extinguisher to use?

Fire extinguishers are designed specific depending upon the fire types:

1. **Powder Fire Extinguisher (Blue Labelled):** Powdered fire extinguisher is a versatile fire safety tool, can be used on class A fire, or in class-B, C & even in electrical fires. The blue label is the identifier of Powder Fire extinguisher, and during fire break-outs the jet is supposed to be used at the base of the fire to subside the fire. It is hand-controlled fire safety equipment.
2. **Water Fire Extinguisher (Red Labelled):** Except for flammable liquids & gases, and cooking or electrical fires, Water Fire Extinguisher are used in fire that involves solid material, to be precise, in Class-A fire. Used at the base to set-off the fire in sweeping stance. It is marked in Blue Label, its product identification mark.
3. **Carbon Dioxide (CO2) Fire Extinguisher (Black Labelled):** Carbon dioxide fire extinguishers are to be used on Class B (flammable liquid) fires and fires involving a lot of electrical equipment. Point the of the fire extinguisher jetting across the fire area. Make sure of not holding the horn of this Carbon Dioxide Fire Extinguisher as it freezes skin.
4. **Foam Fire Extinguisher AFFF (Cream shade Labelled):** The Foam extinguishers used on Class A and B fires. Cream Shade Label is its identification. To extinguish class-A fire, point at the fire base in sweeping motion, and in Class-B, above the burning liquid.
5. **Wet Chemical Fire Extinguisher (Yellow Labelled):** Designed specifically to extinguish Class F fire, but can also be used in Class A & B fire break-out. It is demanded as Fire-safeguard equipment in the Commercial kitchen set-up, and in residential cooking premise. To decrease the intensity of the fire it is to be used in circular motion. Yellow Label is the product identification.
6. **Dry Powder Fire Extinguisher (Blue Label):** Dry powder fire extinguisher caters to cease Class D fires which involves flammable metals. It is Blue Labelled. Dry powder fire extinguisher requires usage training.
7. **Water Mist (Dry Water Mist) Fire Extinguisher (White Labelled):** Water mist fire extinguishers is effective against Class A, B, C & F fire types. It is white labelled written red and is to be used in sweeping motion aiming at the fire base.

Other fire safety equipment

As well as fire extinguishers, there's also other fire safety equipment designed to help in the event of a fire.

- **Fire Blanket:** Fire blankets are often used to tackle hot oil fires, e.g. from a frying pan or used on clothing that has caught fire.
- **Fire Bucket:** A fire bucket is a bucket which is filled with water or sand and can be used to help extinguish some fires.
- **Fire Hose:** A fire hose contains water or foam and can be used to extinguish fires. It should not be used on fires containing electrical equipment or flammable liquids

5.1.6 Use of personal protective equipments

Gas Meter readers may be exposed to a variety of safety hazards while performing their jobs. By wearing appropriate personal protective equipment (PPE), employees can help reduce some of the hazards that are inherent to their jobs and prevent occupational injuries and illnesses.

PPE includes clothing and accessories designed to create a barrier between the employee and contact with harmful agents in the work environment. Examples of PPE include safety glasses, hard hats, gloves, respirators, earplugs, safety shoes, and other specialized clothing and equipment. Examples of harmful agents include flying particles, hot objects, hazardous chemicals, falling objects, blood borne pathogens, high noise, and anything else that could cause injury or illness if it comes into contact with the employee.

There are five basic types of eye and face protection that are required for Gas meter readers:

1. **Safety Glasses:** Spectacle type, either with or without side shields. Eye protectors are used against flying particles, fumes, dust and chemical hazards. Common types are spectacles (often with side shields), goggles, plastic eye shields and face shields. Materials commonly used include poly carbonates, acrylic resins or fibre-based plastics. Poly carbonates are effective against impacts but may not be suitable against corrosives.

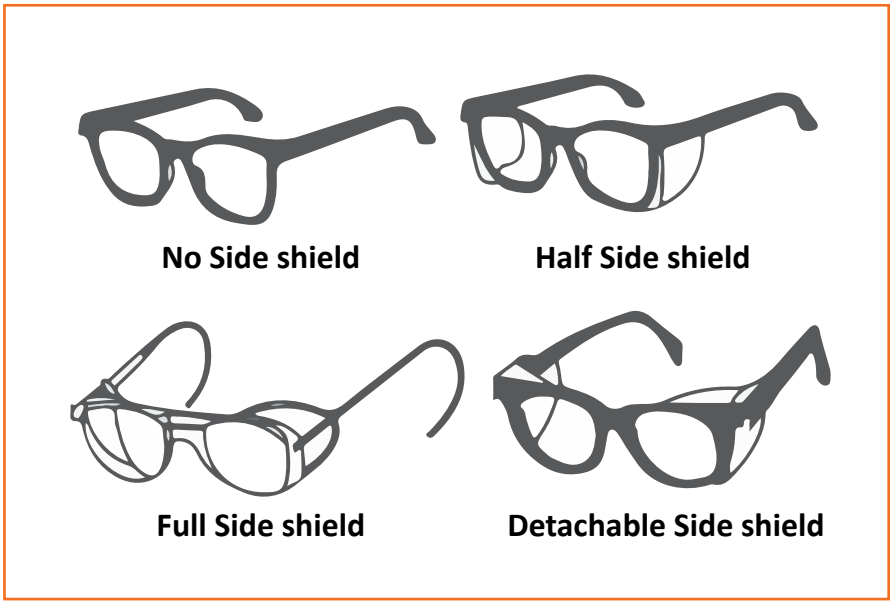


Fig: 5.1.3 Safety glasses

2. **Safety Footwear:** Protective shoes and boots may be made from leather, rubber, synthetic rubber or plastic and may be fabricated by sewing, vulcanizing or moulding. Since the toes are most vulnerable to impact injuries, a steel toe cap is the essential feature of protective footwear wherever such hazards exist. For comfort the toe cap must be reasonably thin and light, and carbon tool steel is therefore used for this purpose. These safety toe caps may be incorporated into many types of boots and shoes.

Fig: 5.1.4 Safety Shoes

Rubber or synthetic outer soles with various tread patterns are used to minimize or prevent the

risk of slipping: this is especially important where floors are likely to be wet or slippery. The material of the sole appears to be of more importance than the tread pattern and should have a high coefficient of friction. Reinforced, puncture-proof soles are necessary in such places as construction sites; metallic insoles can also be inserted into various types of footwear that lack this protection.

3. **Safety Helmets:** The chief purpose of a safety helmet is to protect the head of the wearer against hazards, mechanical shocks. It may in addition provide protection against other for example, mechanical, thermal and electrical.

Fig: 5.1.5 Safety helmet

- It should limit the pressure applied to the skull by spreading the load over the largest possible surface. This is achieved by providing a sufficiently large harness that closely match various skull shapes, together with a hard shell strong enough to prevent the head from coming into direct contact with accidentally falling objects and to provide protection if the wearer's head should hit a hard surface.
- It should dissipate and disperse the energy that may be transmitted to it in such a way that the energy is not passed totally to the head and neck. This is achieved by means of the harness, which must be securely fixed to the hard shell so that it can absorb a shock without being detached from the shell. The harness must also be flexible enough to undergo deformation under impact without touching the inside surface of the shell.
- Materials used in the manufacture of helmets and harnesses should retain their protective qualities over a long period of time and under all foreseeable climatic conditions, including sun, rain, heat, bela-freezing temperature, and so on. Helmets should also have a fairly good resistance to flame and should not break if dropped onto a hard surface from a height of a few meters.

4. **Protective Clothing that include the safety jackets and gloves:** Protective clothing can be made of natural materials (e.g., cotton, wool and leather), man-made fibers (e.g., nylon) or various polymers (e.g., plastics and rubbers such as butyl rubber, polyvinyl chloride, and chlorinated polyethylene). Materials which are woven, stitched or are otherwise porous (not resistant to liquid penetration or permeation) should not be used in situations where protection against a liquid or gas is required.

Specially treated or inherently non-flammable porous fabrics and materials are commonly used for flash fire and electric arc (flash over) protection (e.g., in the petrochemical industry) but usually do not provide protection from any regular heat exposure. It should be noted here that fire-fighting requires specialized clothing that provides flame (burning) resistance, a water barrier and thermal insulation (protection from high temperatures).

Hazard	Performance characteristics require	Common protective clothing material
Thermal	Insulation value	Heavy Material or other natural fabrics
Fire	Insulation and flame resistance	Aluminium gloves, flame resistant treated gloves, aramid fibre and other special fabrics
Mechanical absorption	Abrasion resistance, tensile strength	Heavy fabrics, leather

Key takeaway for protective clothing and gears.

- Before undertaking any new jobs, you should be aware and well educated about the proper use of the above-mentioned protective clothing. The essential pointers include:
- Knowing and understanding the nature and extent of the hazards that could take place ; like gas leakage, tampering, fires, etc.
- the protective clothing should be worn at all points of time, it is an essential part. Without proper protective measures you are not only putting yourself in danger but also the customers.
- You should thoroughly be aware of all the types of protective clothing and their uses
- Be certain to inspect, don, doff, adjust and wear the protective clothing properly, before taking off for jobwork check for any damage to your protective clothing.
- Keep an eye on any damage, signs and symptoms of overexposure or clothing failure. Once used keep yoyr protective gear safely and in proper places to avoid damage.
- It is important to maintain the proper storage, useful life, care and disposal of protective clothing.

5.1.7 Different methods of extinguishing fire

It's important to make sure you have the right types of fire extinguishers on hand to put out common household fires. Read our fire extinguisher safety tips to learn how to stay safe and don't forget to make sure you have the right coverage if your home sustains fire damage.

Getting started with fire extinguishers

The first thing to do when choosing a fire extinguisher is to decide which rooms in your house need one. You should keep at least one on each level of your house. Make sure you keep fire extinguishers handy where fires are more likely to start, like in the kitchen and garage.

Understanding fire extinguisher classes

There are four classes of fire extinguishers – A, B, C and D – and each class can put out a different type of fire.

- **Class A :** Extinguishers will put out fires in ordinary combustibles such as wood and paper.
- **Class B :** Extinguishers are for use on flammable liquids like grease, gasoline and oil.
- **Class C :** Extinguishers are suitable for use only on electrically energized fires.
- **Class D :** Extinguishers are designed for use on flammable metals.

Fig: 5.1.6 Fire extinguisher

Multi purpose extinguishers can be used on different types of fires and will be labelled with more than one class, like A-B, B-C or A-B-C.

Purchasing your fire extinguisher

Now that you know how many extinguishers you need and what types to get, you can head to the hardware store. Look for fire extinguishers that you can easily lift. Larger extinguishers may pack more power, but you must be able to use it properly.

How to use your fire extinguisher

Once you've made your purchases, familiarize yourself with the fire extinguisher directions so you'll be prepared in case you need to put out a fire. Typically, fire extinguishers are fairly easy to use in the case of a fire. Most of the types operate using the P.A.S.S. Technique.

- **P :** Pull the pin on the fire extinguisher in order to break the tamper seal.
- **A :** Aim the fire extinguisher low, with the nozzle pointed at the base of the fire.
- **S :** Squeeze the handle of the fire extinguisher to release the extinguishing agent.
- **S :** Sweep the nozzle from side to side while pointed at the base of the fire until it is extinguished.

If the fire re-ignites, repeat the last 3 steps.

Ensure you and your home is protected in case of a fire or some other household accident with homeowners insurance.

The information listed above was obtained from sources believed to be reliable. Nationwide, its affiliates and employees do not guarantee improved results based upon the information contained herein and assume

no liability in connection with the information or the provided safety suggestions. The recommendations provided are general in nature; unique circumstances may not warrant or require implementation of some or all of the safety suggestions. There may be additional available safety procedures.

Fire is the result of a chemical reaction called combustion, which requires a combination of fuel and oxygen as well as a source of ignition. Different methods can be used to extinguish fires. The methods often involve the removal of heat by cooling the burning material, the cutting of fuel or air source or the adding of chemical substances.

Cooling the burning material

Cooling the burning material is the most common method used to extinguish fire. Water is widely available and the best cooling agent to use specially in fires involving solid materials. By evaporating in contact with fire, water also blankets the fire, cutting off the oxygen supply. However, you should never apply water to fires involving hot cooking oil or fat; water can cause the fire to spread.

Excluding oxygen from the fire

Smothering agents are substances used to extinguish a fire by cutting off the oxygen supply. Foam, which is the content of some fire extinguishers, can help to cool down and isolate the fuel surface from the air, eliminating combustion and being able to resist wind and draught disruption. However, never use foam on energized electrical equipment, because it is an electrical conductor. Other smothering agents include carbon dioxide, which is found in some fire extinguishers and is ideally used in electric equipment and sand, which is effective only on small burning areas.

Removing fuel from the fire

Another method of extinguishing a fire is to remove the fuel supply by switching off the electrical power, isolating the flow of flammable liquids or removing the solid fuel, such as wood or textiles. In woodland fires, a fire-break cut around the fire helps to isolated further fuel. In the case of gas fire, closing the main valve and cutting off the gas supply is the best way of extinguishing the fire.

Using a flame inhibitor

Flame inhibitors are substances that chemically react with the burning material, thus extinguishing the flames. Dry-chemical fire extinguishers work in this way, and can contain mono-ammonium phosphate, sodium and potassium bicarbonate and potassium chloride. Vaporizing liquids, such as Halon, also have a flame inhibiting action. However, most of these substances have been phased out due to high levels of toxicity.

5.1.8 Different materials used for extinguishing fire materials: sand, water, foam, CO^2, dry powder

To deal with the multitude of different fire classes, a range of fire extinguishers have been developed. Please click on the type of extinguisher; this will display more information about that extinguisher type.

- Water /Water Spray /Water Mist (Dry Water Mist) /Dry Powder (Multi-Purpose)/Dry Powder (Special Powders) /Foam (AFFF) /Carbon Dioxide /Wet Chemical/Fire Blanket /Hose Reel /Fire Bucket /Water Extinguisher.

Fig: 5.1.7 Fire extinguisher (Water mist)

Best For: Fires involving organic solid materials such as wood, cloth, paper, plastics, coal etc.

Danger: Do not use on burning fat or oil or on electrical appliances.

How to Use: Point the jet at the base of the flames and keep it moving across the area of the fire. Ensure that all areas of the fire are out.

How it Works: Water has a great cooling effect on the fuel's surface and thereby reduces the pyrolysis rate of the fuel.

Water Spray Extinguisher (Water with additive)

Best For : Fires involving organic solid materials such as wood, cloth, paper, plastics, coal etc. These offer significantly improved fire-fighting capability compared to traditional jet type water fire extinguishers. Available in 3 and 6 litres.

Fig: 5.1.8 Fire extinguisher (Aqua mist)

Danger : Do not use on burning fat or oil or on electrical appliances.

How to Use : Point the jet at the base of the flames and keep it moving across the area of the fire. Ensure that all areas of the fire are out.

How it Works : Water has a great cooling effect on the fuel's surface and thereby reduces the pyrolysis rate of the fuel. Instead of a jet nozzle a spray nozzle is used, with a higher pressure, which creates a fine spray. This allows for a given quantity of water to have a considerable increase in the surface area presented to the fire. This makes extinguishing more efficient by more rapid extraction of heat, formation of steam etc. They can also contain surfactants which help the water penetrate deep into the burning material which increases the effectiveness of the extinguisher.

Water Mist Extinguisher ('Dry' Water Mist)

Fig: 5.1.9 Fire extinguisher (Dry water mist)

Best For : The first broad spectrum extinguisher to tackle A, B, C rated risks as well as fats and deep fat fryers (Class F). Models with dielectric test to 35k Volts can be safely used on electrical fires (up to 1000 Volt) if a safety distance of 1m is adhered to, as their mist (de-ionised water) does not conduct electricity and the extinguisher does not normally form puddles, which could conduct electricity. The Ultra Fire water mist extinguishers also contain only de-ionised water which cannot carry any electric current.

Danger : Water mist extinguishers are safe for discharge on all fire classifications bar Class D blazes.

How to Use : Point the jet at the base of the flames and keep it moving across the area of the fire. Ensure that all areas of the fire are out. The fire draws the microscopic water particles into the fire.

How it Works : Water is turned into microscopic particles in the supersonic nozzle. The water mist is drawn to the fire where it cools and suffocates the fire. The mist also forms a safety barrier between user and fire, which keeps some of the heat back.

Fig: 5.1.10 Fire extinguisher (Powder)

Powder Extinguisher (Multi-Purpose)

Best For : Can be used on fires involving organic solids, liquids such as grease, fats, oil, paint, petrol, etc. but not on chip or fat pan fires. Can also be used on gas fires.

Danger : Safe on live electrical equipment, although does not penetrate the spaces in equipment easily and the fire may re-ignite. This type of extinguisher does not cool the fire very well and care should be taken that the fire does not flare up again.

Smoldering material in deep seated fires such as upholstery or bedding can cause the fire to start up again. Do not use on domestic chip or fat pan fires. There is danger of inhalation if powder extinguishers are used within buildings. Due to this, and the potential for powder to impair vision, powder extinguishers are no longer recommended for use within enclosed spaces.

How to Use : Point the jet or discharge horn at the base of the flames and, with a rapid sweeping motion, drive the fire towards the far edge until all the flames are out. If the extinguisher has a hand control, wait until the air clears and if you can still see the flames, attack the fire again.

How it Works : Similarly to almost all extinguishing agents the powder acts as a thermal ballast making the flames too cool for the chemical reactions to continue. Some powders also provide a minor chemical inhibition, although this effect is relatively weak. These powders thus provide rapid knock-down of flame fronts, but may not keep the fire suppressed.

Dry Powder Extinguisher (Special Powders)

Best For : These specialist powder extinguishers are designed to tackle fires involving combustible metals such as lithium, magnesium, sodium or aluminium when in the form of swarf or powder.

There are three special powders based on graphite, copper and sodium chloride.

Danger : Do not allow water to come in contact with the burning metal and the powder must be gently applied. Sodium chloride is not recommended for lithium.

How to use : The lance enables the user to tackle fires at a safe distance. The low velocity applicator reduces the energy of the jet allowing the powder to gently smother the surface of the burning material thus avoiding scattering the high temperature particles and stimulating the formation of a crust. The method of application is completely different from a standard extinguisher and user training is required. They are not suitable for use on live electrical fires.

How it Works : This extinguisher works by forming a crust which insulates the metal to prevent access to other combustible material nearby and smothering the fire to prevent oxygen from the atmosphere reacting with the metal

Foam Extinguisher (AFFF)

Best For : Fires involving solids and burning liquids, such as paint and petrol but not suitable for chip or fat pan fires. Safe on fires caused by electricity if tested to 35kV (dielectric test) and a 1m safety distance is adhered to.

Fig: 5.1.11 Fire extinguisher (Foam)

Danger : Do not use on chip or fat pan fires.

How to Use : For fires involving solids, point the jet at the base of the flames and keep it moving across the area of the fire. Ensure that all areas of the fire are out. For fires involving liquids, do not aim the jet straight into the liquid. Where the liquid on fire is in a container, point the jet at the inside edge of the container or on a nearby surface above the burning liquid. Allow the foam to build up and flow across the liquid.

How it Works : They are mainly water based, with a foaming agent so that the foam can float on top of the burning liquid and break the interaction between the flames and the fuel surface.

Carbon Dioxide Extinguisher

Best For : Live electrical equipment, although it allows re-ignition of hot plastics. Now mainly used on large computer servers, although care has to be taken not to asphyxiate people when using the extinguisher in small server rooms.


Fig: 5.1.12 Fire extinguisher (carbon dioxide)

Danger : Do not use on chip or fat pan fires, as it can carry burning fat out of the container. This type of extinguisher does not cool the fire very well and you need to ensure that the fire does not start up again. Fumes from CO2 extinguishers can asphyxiate if used in confined spaces: ventilate the area as soon as the fire has been controlled. Only use CO2 extinguishers with frost-free horns, as the hand holding the horn can otherwise be frozen to the horn, as the gas gets very cold during the discharge.

How to Use : The discharge horn should be directed at the base of the flames and the jet kept moving across the area of the fire.

How it Works : Carbon dioxide extinguishers work by suffocating the fire. Carbon dioxide displaces oxygen in the air. However, once discharged, the CO2 will dissipate quickly and allow access for oxygen again, which can re-ignite the fire.

5.1.9 Rescue techniques applied during a fire hazard

Fires are the accidents which occur most frequently, whose causes are the most diverse and which require intervention methods and techniques adapted to the conditions and needs of each incident.

Depending on the type of fire (nature of the material ablaze), meteorological conditions (wind) and the effectiveness of the intervention, material damage can be limited (a single car, building or production or storage warehouse installation), or affect wide areas (forest or agricultural fires, hydrocarbons, gas or other highly flammable products, storage or piping installations, harbor installations and rail or marine transport equipment). Explosions are in a different category.

Each type of fire is the object of specific technical prescriptions as regards prevention, intervention and the behaviour of the population affected. It is also relevant to note that many fires have a criminal origin and that in times of armed conflict or crisis as well as of indirect wars (sabotage) human intervention also provokes major accidents.

For practical reasons it is best to refer to technical documentation, which should be known or available to all security and fire-fighting services, and to national and regional disaster alarm and information centres.

This is especially the case for rescue and fire extinction on motorways, buildings designed to be used by a great number of people (hospitals, hotels, cinemas, high-rise buildings, department stores, etc...); Fires affecting chimneys, attires, cotton (bales, loose, explosive dust), fodder (fermentation), fires in high warehouses, silos or underground garages as well as forest fires.

All these types of intervention are subject to special measures.

1. Preventive and protective measures

Fires can spread more or less rapidly depending on their causes, the nature of the material and goods alight, the fire prevention installations (automatic sprinklers), meteorological conditions, the ways the population is informed and the initiative it shows, as well as the speed and efficiency of the intervening services and of their fire-fighting equipment.

In the light of experience, prevention is seen to be most important and consists of two distinct components. On the one hand, the primary responsibility falling upon the political authorities empowered to implement the legal prescriptions concerning fire protection, to forecast accidents and to inform the population, as well as to set up measures and means for fighting fires and explosions. On the other hand, the responsible behaviour of each individual based upon an education geared towards caution and the respect of instructions in case of fire.

Defining, and controlling the implementation of, the particular rules of protection against fires, specific to each enterprise presenting a potential danger, including the training of security personnel, is also relevant in this context.

The many types of fire and the preventive and protective measures which relate to them, make it advisable to limit the present study to the specific measures falling to the political authorities in one area only, namely that of **"forest fires"**. This type of fire is of particular interest to developing countries and the preventive measures to be applied have a general representative value, that is:

- Organizing an observation service, prevention and alarm (security) service at local and regional levels.
- Implementing legislation regulating the use of fire by all the population present in or at the edge of forests, and more particularly by owners and individuals exercising a professional activity in sensitive areas.
- Planning and concrete preparation (periodic maintenance) for fire-fighting through adequate landscaping of the territory and appropriate forest cultivation limiting fire propagation (alternating vegetation, clearance, trimming), creating and maintaining access paths (extinction) and fire-break areas as well as fire-fighting equipment such as water supplies (conduits, cisterns), watch towers and meteorological posts, and the construction of helicopter landing pads.
- Surveillance and detection of fires as soon as the danger of fires is forecast by the ad hoc meteorological service (which comprises automatic or mobile statistics posts observing the winds and the vegetation: dryness, force, direction, evolution).
- As soon as the danger of fire increases, activating an alarm plan (basic intervention plan) requiring the engagement of preventive intervention squads (firemen), and their wide positioning as near as possible to the threatened zones, and making available water bombers and specialized aerial machines ready for action.
- Preparation and concretization (organization) of an intervention mechanism: this requires the setting up of specialized management programmers ensuring the coordination of powerful and efficient equipment and means for fighting forest fires (instruction).
- Preparedness management and the coordination of the use of the means of intervention of the authorities and the information and alarm services for the population require a secure transmission network (radio network).
- Planning the evacuation of the population possibly under threat in the various sensitive areas, particularly if there are risks of explosion (reservoirs and gas conduits explosives or ammunition dumps, hydrocarbon production, handling or transport installations, other dangerous material, etc.).

2. Intervention and assistance measures

The means of intervention brought into coordinated action at the local, regional or cross-boundary level vary according to the seriousness of the incident. The time factor and the quality of the intervention are of primary importance. Fire-fighting requires that substantial means be available at the right time and place and brought into action as quickly as possible. The chances of success are greater when the fire has

just broken out.

Generally, bringing into action the ways and means of fighting fires and explosions is the responsibility of the communal authorities that can call on firemen (professionals or volunteers) reinforced by the civil or military means of intervention available. But clearly, mastering major fires and specific fires and managing particularly powerful explosions require the technical support of professionals and experts, especially in the case of toxic or radioactive fall-out. When these reinforcements are necessary, they must be made available at the regional or national level. If national means of intervention prove insufficient to ensure the safeguard of the population and the environment, the government of the country affected by the disaster should appeal for international emergency assistance.

With regard to **"forest fires"**, the means of extinction are logically adapted to the technical possibilities of the states and sectors concerned. The old technique of **"fire beating"** is still often called upon; this requires numerous working hands, courage and a sense of civic duty, with little chance of success. In developed countries, extinction techniques increasingly make use of water, generally with chemical additives (retardants or foams). Intervention techniques must be adapted accordingly and call upon very competent personnel using mobile and fast equipment such as off-track vehicles, motorized pumps, tankers, water cannons, and aviation (water bombers, airplanes or helicopters of varied capacities).

The manpower is therefore made up of a minority of professional firemen (leaders) and a majority of volunteers. Bringing this force into action therefore involves an operational and strategic operation with an effective management structure having reliable means of command. The key to success lies in the coordination of the different protection and assistance measures and the cooperation of all of the means and services involved.

Because of the similarity in the damage caused by an explosion and an earthquake (direct and secondary effects) it seems relevant to apply the same principles of intervention and assistance to these two types of disasters, especially with regard to intervention tactics, the management structure and the disaster plan.

3. Instructions for the population

A. General precautions and safety measures relating to a potential danger

Keep matches and lighters out of the reach of children and teach them caution around fires and inflammable objects

- Do not keep inflammable products (alcohol, petrol, gas containers, paper, cloth, dried vegetable matter, etc.) Near any source of heat
- Know the instructions relating to fires, find out about protection measures, know the whereabouts of gas and electricity conduits and learn to use domestic fire-fighting equipment (extinguishers, fire reels and hoses, nozzles ,etc.)
- Do not smoke, do not light fires, do not switch on electrical equipment or machinery likely to make sparks when handling, or pouring inflammable or toxic products (petrol, alcohol, gas, etc...), Or if they are leaking
- Know the telephone numbers of the fire-fighting and civil protection services and of the police
- Respect instructions forbidding staying, lighting fires, or smoking in forests, plantations,

agricultural installations, wooden houses, etc., During dry spells or violent winds.

- Obey the rules, regulations and orders of the authorities, their control organs and the representatives of fire or police services.

B. During a fire

- Act in a calm and thoughtful manner, avoid panic.
- Call for assistance by first alerting the firemen (fire service) and precisely identifying the area (locality, road, number, type of accident, and also the name and address of the caller).
- Immediately warn persons in danger and those responsible for security in the building or the enterprise, especially in public places.
- Try to rescue persons and animals in danger (wrap people whose clothing is alight in blankets or coats and roll them on the ground).
- Prevent the rush of air by closing all doors and windows and switching off ventilation; do not use the lifts, leave the premises (stairs, exits and emergency exits).
- If stair wells and corridors are filled with smoke, stay in the flat, close the door and water it frequently, draught-proof it with wet rags. Show your presence at the windows (without opening them); if you are in a place that is getting filled with smoke, stay low on the ground where the air remains fresh.
- Fight the fire with all available means (fire extinguishers, in-house hydrants, pouring water from utensils using the bath tub or sink as an improvised water reservoir.
- Extinguish oil or fat fires (liquids or recipients on fire) by covering them with a damp cloth. If an electrical apparatus catches fire do not use water on twitch off the current immediately and pull out the plug.
- Inform and guide firemen or other rescuers and follow their instructions.

C. After the main fire has passed

Leave the house only if all parts of your body are protected (leather shoes, gloves, hat, clothes made of non-synthetic material);

- Inspect your house and extinguish those parts which are burning (doors, shutters, etc.);
- Inspect the roof, the timber frame, the attic and extinguish the cinders which may have infiltrated under the roof tiles and small openings by using the water hose or other recipients filled with water.
- Water the vegetation surrounding your home and extinguish small flames if any.
- Assist your neighbours and persons in danger (first aid).
- Obey orders of the firemen and of the authorities' representatives.

5.1.10 Various types of safety signs and what they mean

These regulations brought into force the EC safety signs directive 92/58/EEC on the provision and use of safety signs. The safety signs directive was adopted by all European union member states on 24 June 1992, which recognized the need for all workplaces to have easily recognizable signs and symbols relating to safety matters and encourage the standardization of safety signs throughout the member states of the European union so that safety signs, wherever they are seen, have the same meaning. In this country, the directive has been implemented through the health and safety (safety signs and signals regulations) 1996. These regulations apply to all places of work covered by the health and safety at work etc. Act 1974.

The regulations cover various means of communicating health and safety information. These include the use of illuminated signs, hand and acoustic signals, e.g. Fire alarms, spoken communication and the marking of pipe work containing dangerous substances. These are in addition to traditional signboards such as prohibition and warning signs. Fire safety signs, i.e. Signs for fire exits and fire-fighting equipment are also covered.

They require employers to provide specific safety signs whenever there is a risk that has not been avoided or controlled by other means, e.g. Engineering controls and safe systems of work. Where a safety sign would not help to reduce that risk, or where the risk is not significant, there is no need to provide a sign. The regulations, where necessary, require the use of road traffic signs within workplaces to regulate road traffic and also require employers to maintain the safety signs which are provided by them, explain unfamiliar signs to their employees and tell them what they need to do when they see a safety sign.

The regulations apply to all places and activities where people are employed, but exclude signs and labels used in connection with the supply of substances, products and equipment or the transport of dangerous goods.

Categories of safety signs

Safety signs are divided into categories according to the type of message they are intended to convey. Each category is assigned a specific format and set of colours.

Prohibition signs

These signs should he used to convey **"do not"** type commands for example, to indicate that smoking is not allowed or that, where a particular material reacts dangerously with water or water should not be used to extinguish a fire. In the workplace they should be used to reinforce instructions prohibiting dangerous activities. Such instructions, however, should also form part of the employees training. Signs prohibiting an activity consist of a circular red band and single diagonal cross bar descending from left to right at an angle of 45 degrees. The background should be white with the pictogram indicating the nature of the command in black.

Fig: 5.1.13 Prohibition Sign

Warning signs

These signs should be used to make people aware of a nearby danger. For example, a flammable liquid store or a laboratory where radioactive substances are in use should have an appropriate warning sign near the entrance. These signs are required by the health and safety (safety signs and signals) regulations 1996 and in specific cases by the dangerous substances (notification and marking of sites) regulations 1990. Signs warning of a particular hazard consist of a black band in the shape of an equilateral triangle. The background within the band should be yellow with the pictogram indicating the type of hazard in black positioned centrally on the sign.

Fig: 5.1.14 Warning Sign

Mandatory signs

These signs should he used to indicate actions that must be carried out in order to comply with statutory requirements. For example self-closing fire doors that must be kept closed to comply with the fire risk assessment should be labelled with **"fire door keep shut"** signs. An area of a construction site where hard hats should be worn should also have appropriate signs at the entry points. It should he noted that the health and safety (safety signs and signals) regulations 1996 do not apply to mandatory fire instructions but do apply to health and safety mandatory signs where pictograms are required. The minimum regulatory requirement is for the sign to include an appropriate pictogram, there are no pictograms for fire safety instruction signs and although mandatory in the uk through inclusion in the requirements of workplace fire assessments, such signs are not considered as health and safety signs within these regulations. Thus the familiar white on blue fire safety mandatory signs using text only will remain in place and will not have to be changed.

Fig: 5.1.15 Mandatory sign

Fire instruction notices, that are notices which list actions that occupants must carry out in the event of a fire are, by convention, written as white text on a blue background but not in the circular format. The colours are used to convey the mandatory nature of the instructions but because of the amount of text normally needed a rectangular format is used. The general mandatory sign of a white exclamation mark on a blue circle may be used in conjunction with a fire instructions notice.

Safe condition signs

These signs should he used to indicate escape routes, emergency exits, first aid equipment, emergency showers and the like. Safe condition signs consist of a green rectangle or square with the pictogram or text in white positioned centrally. In the same way as for mandatory signs some uk fire safety signs in this category are not required by the health and safety (safety signs and signals) regulations 1996. For example **"push bar to open"** is not required to comply and there is no pictogram with that meaning. Such signs are still needed for compliance with other UK legislation.

Exit signs

In order to comply with the requirements of the building regulations, every doorway or other exit

providing access to a means of escape, other than exits in ordinary use, should be provided with an exit sign. Installation of signs conforming to British standard 5499: part 4: 2000 will satisfy both the building regulations and the health and safety (safety signs and signals regulations) 1996. In general these regulations will not require any changes where existing fire safety signs containing symbols comply with BS 5499**:** part 4 **:** 2000 fire safety signs, notices and graphic symbols. This is because the signs in BS 5499, although different in detail to those specified in the regulations, follow the same basic pattern and are therefore considered to comply with the regulations.

Fig: 5.1.16 Exit sign

Provision of exit signs

The regulations place a duty on employers to ensure that safety signs are provided in circumstances where the risk to the health and safety of employees, identified through the risk assessment requirement contained with the management of health and safety at work regulations 1992 cannot be entirely, engineered or managed out of the workplace. It should be noted that the regulations do not require safety signs to be used where there are no significant risks to the health and safety of employees. The issue which then requires to be resolved is whether it is necessary to indicate exits with signs. In arriving at a decision the fundamental issue which will underpin the process is whether the risk of injury or death to employees from a fire within particular premises is deemed to be significant enough to warrant the provision of signs indicating fire exit routes and final exits. If it is deemed that the risk is not significant then there is no need to install the signs. Thus, for example, a small, single storey premises with one clearly visible exit should not require a fire exit sign because it would be obvious to staff that the door is their only means of access/egress and hence there should not be a significant risk to their health and safety from fire by not signing the door as an exit. However, those buildings with more complex internal layouts incorporating multiple exits, some of which may not be readily visible nor frequently used, or where large numbers of the public congregate, will require fire exit signs. They should be complete with directional arrows, if there is a significant risk of individuals not being able to find their way to a place of safety in the event of a fire.

Supplementary information signs.

These are signs used to provide additional information. In the health and safety (safety signs and signals) regulations 1996 these are confined to directional arrows. However BS 5499 : part 4 : 2000 includes various text messages as well as arrows under the description of supplementary signs. To comply with the regulations where a direction indication is needed the minimum requirement is for a supplementary sign in the form of an arrow. The supplementary text messages in the British standard such as **"water as an extinguishing agent prohibited"** will be acceptable under the regulations only if accompanied by an appropriate pictogram. This is entirely consistent with the philosophy of the British standard. Supplementary signs consist of a square or rectangle in the appropriate colour with the pictogram or text in white and positioned centrally. The colour should be green where the information supplements a safe condition sign, red where it supplements a

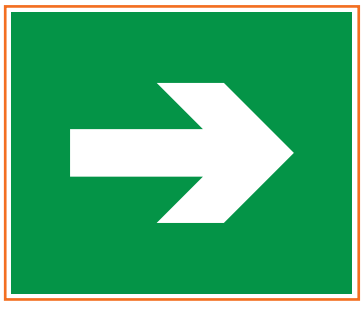


Fig: 5.1.17 Supplementary information sign

fire equipment sign or yellow to supplement a warning sign.

There is a minor conflict between the British standard and the regulations on the permitted colour of supplementary signs. BS 5499: part 4: 2000 allows text to be in black on a white background or white on the appropriate colour. The colour alternative is the only option permitted in the regulations. Thus the regulations can be complied with by adhering to this option in the standard.

Illumination of sign

Exit signs should be legible at all material times. In premises where emergency lighting has been considered necessary for means of escape purposes such signs should be illuminated by the emergency lighting supply in the event of a failure of the normal lighting. Any of the following methods are considered suitable,

- Lamps external to the sign but providing adequate illumination of it,
- Lamps contained within the sign, internally illuminated signs,
- Self-luminous signs requiring no external power source.

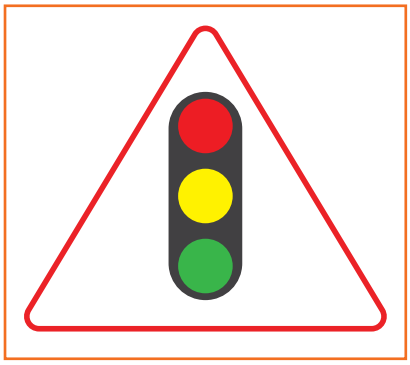


Fig: 5.1.18 Illumination Sign

Reference should be made to the British Standards where appropriate.

Photo luminescent sign

The visible areas of these signs are manufactured from photo luminescent materials. These materials contain chemicals that are able in absorb and store energy from daylight or artificial lighting. When the source of energy is removed the chemicals are able to release the energy in the form of light. Several companies produce photo luminescent signs with pictograms complying with these regulations although the colours may not exactly match the specifications within the regulations.

Fig: 5.1.19 Photo Luminescent Sign

The properties of these signs make them useful to supplement normal signs in some situations. For example, they perform well as signs under the reduced light levels provided by emergency escape lighting operating on failure of the normal supply. There is no objection to the use of this material to supplement emergency lighting, but it is not acceptable to use it as an alternative to emergency lighting. This type of material is often used in strips at low level to highlight the contours of escape routes. The same material also finds a use in way finding systems.

Photo luminescent systems should be installed in compliance with the code of practice for the installation in premises of emergency way-finding guidance systems, produced from photo luminescent materials, safety signs and markers. This code is published by the photo luminescent safety products association.

Fire fighting equipment signs

These signs are used to mark the location of fire-fighting equipment and fire alarm activation points. However, where possible, fire equipment should be positioned where it is clearly visible. Red to be used as the identifying colour for fire-fighting equipment. If the equipment itself is red this will satisfy the

requirement. Where it is not red then highlighting the position of fire-fighting equipment by colouring background behind the equipment red may be enough to comply.

Fire equipment signs consist of a red rectangle or square with the pictogram in white positioned centrally on the sign.

Fig: 5.1.20 Fire Fighting Equipment Signs

Provision of fire-fighting equipment signs

The same general process outlined above is applicable to this section. Again it is assumed that because there is a possibility of a fire occurring in the premises then fire-fighting equipment will be needed. Whether this equipment also requires to be identified by means of a sign will depend on the physical environment in which the fire risk assessment takes place. In other words the features of the workplace, the activities carried on there and any other circumstances deemed to be pertinent must be taken into account. For example, in a building where the internal layout is such that the extinguishers provided are clearly visible to employees there should not be a requirement to further indicates the position of the fire-fighting equipment with a sign, or by colouring the background red.

Alternatively, in more complex building layouts, for example where it is not always possible to ensure that fire extinguishers are in the line of sight of employees, for example due to the nature of the work process or where hose reels are installed within cabinets or where fire-fighting equipment is contained within recessed fire points then it would be pertinent to provide signs indicating the position of the equipment complete with directional arrows where applicable. It is important to highlight that the process by which a decision is reached regarding the necessity or otherwise of providing fire-fighting equipment signs should be based on whether a significant risk exists as a consequence of the particular location of such equipment. If it is deemed that a significant risk does not exist then there is no requirement to provide the signs.

Summary of safety signs

The pictogram are as shown in the regulations and the completed sign must be in accordance with the appropriate colours.

Type	Shape	Colour	Pictograms
Prohibition Signs These signs prohibit actions detrimental to safety No Smoking	Circular	RED with a white background red band and crossbar.	
Warning Signs These signs give warning of potential risks Triangular	Triangular	YELLOW with black symbol or text	

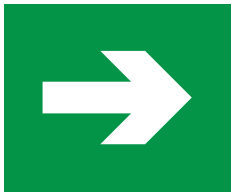
Type	Shape	Colour	Pictograms
Mandatory Signs Signs that require actions or activities that will contribute towards safety.	Circular	BLUE with symbol or text in white	
Safe Condition Signs These signs indicate exit routes in the event of a fire or emergency.	Rectangular	GREEN with white symbol or text	
Fire Equipment Signs These signs are used to indicate the location of fire equipment.	Rectangular or Circle	Red with white symbols or text	
Supplementary Information Signs	Rectangular	Green, Red, Yellow, with White or Black Text	

Table: 5.1.1 Few safety signs

Fire warning systems

Where evacuation from buildings is needed, the regulations require the fire alarm signal to be continuous. Fire alarms conforming to BS 5839 part 1: 2017 fire detection and alarm systems for buildings do not need changing, nor do other acceptable means such as manually operated sounders, e.g. Rotary gongs or hand bells.

Fig: 5.1.21 Fire Warning Signs

Pictogram

The regulations require all signs should use graphic symbols or pictographs to convey its message but it does not prohibit the use of supplementary text. It indicates the intrinsic features required and some are indicated below,

- The shape and colours of signboards are set out, in accordance with their specific object (signboards indicating a prohibition, a warning, a mandatory action, an escape route, emergency

or fire-fighting equipment).

- Pictogram must be as simple as possible and should contain only essential details.
- The pictogram used may be slightly different from or more detailed, provided that they convey the same meaning and that no difference or adaptation obscures the meaning.
- The dimensions and colorimetric and photometric features of signboards must be such that they can be easily seen and understood.

It also illustrates a list of single pictogram that should be used for exit signs the five are shown below.

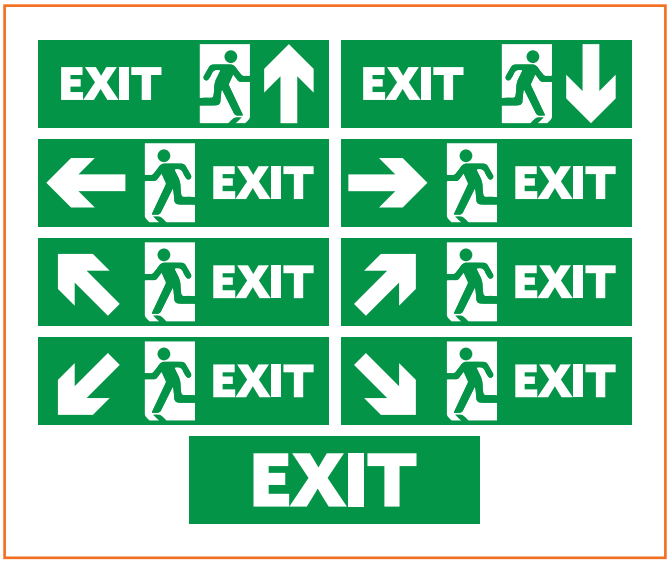


Fig: 5.1.22 Few different direction exit sign

As the result of this flexibility there are at least two exit signs available in the UK and there could be more throughout the EC. Because of this the EC directive 92/58 has failed in its principle aim to have common standard throughout the member states. However a new European standard has been proposed and ISO 7010 is very likely to be fast tracked to become Pr EN 7010. This means that it will be a **"European normative"** and will be best practice guidance. As a result EU law will required it to be adopted by all member states without change. Consequently the health and safety (safety signs and signals) regulations 1996 will be amended and the above pictogram will be illegal. Pr en 7010 will become the required standard and incidentally the exit sign will be identical to BS 5499: part 4: code of practice for escape route signing.

General advice

If, following the fire risk assessment, it is deemed necessary to provide any fire safety signs then they should comply with the regulations which details the colour, maintenance regime and general advice associated with the provision and use of safety signs in general. It is also deemed fire safety signs which comply with BS 5499 and ISO 7010 meet the requirements of regulations. Fire safety signs deemed not to be acceptable are those which contain text only information therefore such signs should no longer be used. However in the case of existing premises where such text only signs are already in place and the risk assessment determines they are necessary, employers will have to replace them or supplement them with the appropriate pictogram.

5.1.11 First aid

Appropriate basic first aid treatment relevant to the condition e.g. Shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries.

First aid is the assistance given to any person suffering a sudden illness or injury, with care provided to preserve life, prevent the condition from worsening, or to promote recovery. It includes initial intervention in a serious condition prior to professional medical help being available, such as performing CPR while awaiting an ambulance, as well as the complete treatment of minor conditions, such as applying a plaster to a cut. First aid is generally performed by the layperson, with many people trained in providing basic levels of first aid, and others willing to do so from acquired knowledge. Mental health first aid is an extension of the concept of first aid to cover mental health.

There are many situations which may require first aid, and many countries have legislation, regulation, or guidance which specifies a minimum level of first aid provision in certain circumstances. This can include specific training or equipment to be available in the workplace (such as an automated external defibrillator), the provision of specialist first aid cover at public gatherings, or mandatory first aid training within schools. First aid, however, does not necessarily require any particular equipment or prior knowledge, and can involve improvisation with materials available at the time, often by untrained persons.

Electrical shock

Shock is what happens when the heart and blood vessels are unable to pump enough oxygen-rich blood to the vital organs of the body. Although every illness and involves shock to some degree, it can be a life threatening problem. The best way to protect people from the serious damages that shock can have on the system is to recognize the signs before the person get into serious trouble. In most cases, only a few of the symptoms will be present, and many do not appear for some time.

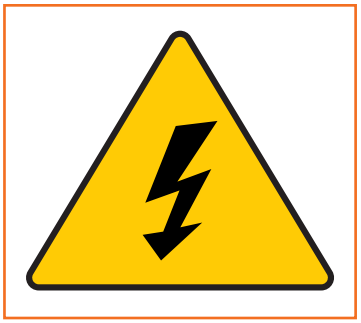


Fig: 5.1.23 Electrical Shock sign

Classification of shock

Hypovolemic shock: This form of shock is brought on by a decrease in the amount of blood vessels or other fluids in the body. Excessive bleeding from internal and external injuries, fluid loss due to diarrhoea, burns, dehydration, and severe vomiting usually cause this kind of shock.

Neurogenic shock: In the case of neurogenic shock, the blood vessels become abnormally enlarged and the pooling of the blood disallows an adequate blood flow to be maintained. Fainting is an example of this sort of shock, as the blood temporarily pools as the person stands. When the person falls the blood rushes back to the head and the problem is solved.

Psychogenic shock: This shock is more common, and is known as a **"shock like condition"**. It is produced by excessive fear, joy, anger, or grief. **"Shell shock"** is a psychological adjustment reaction to stressful wartime experiences. Treatment for shell shock is limited to emotional support and help from a medical facility.

Anaphylactic shock: This form of shock is brought on by an allergic reaction from a food, bee sting or other insect bite, and inhalants. For more information on the care and treatment click the link below. Anaphylactic shock

Causes of shock

There are several main causes of shock

- Heart conditions (heart attack, heart failure)/heavy internal or external bleeding, such as from a serious injury or rupture of a blood vessel
- Dehydration, especially when severe or related to heat illness
- Infection (septic shock)/severe allergic reaction (anaphylactic shock)/spinal injuries (neurogenic shock) burns/persistent vomiting or diarrhoea

Bleeding

In this section you can find out what to do about bleeding and blood loss. You can learn how to give first aid treatment for cuts, grazes, and nose bleeds as well as finding out what to do if someone is bleeding severely.

Fig: 5.1.24 Bleeding

You can usually control bleeding from cuts and grazes by elevating the wound and applying pressure.

A nose bleed can be serious if someone loses a lot of blood – and severe bleeding can cause distress, lead to shock and loss of responsiveness. This advice will help to give you the confidence to know what to do when a person is bleeding severely.

For severe bleeding, take these first-aid steps and reassure the injured person.

1. Remove any clothing or debris on the wound. Don't remove large or deeply embedded objects. Don›t probe the wound or attempt to clean it yet. Your first job is to stop the bleeding. Wear disposable protective gloves if available.
2. Stop the bleeding. Place a sterile bandage or clean cloth on the wound. Press the bandage firmly with your palm to control bleeding. Apply constant pressure until the bleeding stops. Maintain pressure by binding the wound with a thick bandage or a piece of clean cloth. Don›t put direct pressure on an eye injury or embedded object.

   Secure the bandage with adhesive tape or continue to maintain pressure with your hands. If possible, raise an injured limb above the level of the heart.
3. Help the injured person lie down. If possible, place the person on a rug or blanket to prevent loss of body heat. Calmly reassure the injured person.
4. Don't remove the gauze or bandage. If the bleeding seeps through the gauze or other cloth on the wound, add another bandage on top of it. And keep pressing firmly on the area.
5. **Tourniquets:** a tourniquet is effective in controlling life-threatening bleeding from a limb. Apply a tourniquet if you›re trained in how to do so. When emergency help arrives, explain how long the tourniquet has been in place.
6. Immobilize the injured body part as much as possible. Leave the bandages in place and get the injured person to an emergency room as soon as possible.

Breaking the bone

A broken bone happens when one of your bones becomes cracked or broken into multiple pieces. It's also known as a fracture. It can result from a sports injury, accident, or violent trauma.

Broken bones usually aren't life threatening, but they do require immediate medical care. Learn how to recognize the symptoms of a broken bone, provide first-aid treatment, and get professional help.

Symptoms

What are the symptoms of a broken bone?

A broken bone can cause one or more of the following signs and symptoms:

- Intense pain in the injured area that gets worse when you move it.
- Numbness in the injured area.
- Bluish colour, swelling, or visible deformity in the injured area.
- Bone protruding through the skin.
- Heavy bleeding at the injury site.
- A burn is tissue damage that results from scalding, overexposure to the sun or other radiation, contact with flames, chemicals or electricity, or smoke inhalation.

A minor burn that doesn't require emergency care may involve

- Superficial redness similar to a sunburn /pain /blisters/an area no larger than 3 inches (about 8 centimetres) in diameter.

Treating major burns

Until emergency help arrives

- Protect the burned person from further harm. If you can do so safely, make sure the person you›re helping is not in contact with the source of the burn. For electrical burns, make sure the power source is off before you approach the burned person.
- Make certain that the person burned is breathing. If needed, begin rescue breathing if you know how.
- Remove jewellery, belts and other restrictive items,especially from around burned areas and the neck. Burned areas swell rapidly.
- Cover the area of the burn. Use a cool, moist bandage or a clean cloth.
- Don't immerse large severe burns in water. Doing so could cause a serious loss of body heat (hypothermia).
- Elevate the burned area. Raise the wound above heart level, if possible.
- Watch for signs of shock. Signs and symptoms include fainting, pale complexion or breathing in a notably shallow fashion.

Treating minor burns

For minor burns:

Fig: 5.1.25 Cool the burn

- Cool the burn. Hold the burned area under cool (not cold) running water or apply a cool, wet compress until the pain eases.
- Remove rings or other tight items from the burned area. Try to do this quickly and gently, before the area swells.
- Don't break blisters. Fluid-filled blisters protect against infection. If a blister breaks, clean the area with water (mild soap is optional). Apply an antibiotic ointment. But if a rash appears, stop using the ointment.
- Apply lotion. Once a burn is completely cooled, apply a lotion, such as one that contains aloevera or a moisturiser. This helps prevent drying and provides relief.
- Bandage the burn. Cover the burn with a sterile gauze bandage (not fluffy cotton). Wrap it loosely to avoid putting pressure on burned skin. Bandaging keeps air off the area, reduces pain and protects blistered skin.
- If needed, take an over-the-counter pain reliever, such as ibuprofen (Advil, Motrin IB, others), naproxen sodium (Aleve) or acetaminophen (Tylenol, others).

Eye injury

Accidents happen and when they do, it is important to know how to handle them. Here are some first aid tips for eye injuries.

First aid for eyes and chemical exposure

If you wear contact lenses, remove them immediately if you get chemicals in your eyes. Keeping them in your eyes may hold the chemical against the cornea, causing unnecessary, potentially permanent damage and pain.

- If you suspect chemicals have entered your eye, begin flushing it immediately with cool water and continue to do so for approximately 15 minutes.

First aid when you have something in your eye

If you have an object in your eye, do not irritate your eye by rubbing it. You may try to remove the particle if it is not embedded in the eye. But, follow these first aid tips first:

- First wash your hands thoroughly with soap and warm water. This will prevent further contamination or infection.
- Try flushing the eye with water. Using your finger and thumb, gently pull the upper eyelid down over the top of the lower eyelid. This should cause tearing and flush the object out. You may need to repeat this several times.
- If you can see the object, you may try to remove it from your eye with a wash cloth. Gently lift the upper or lower eyelid, and use a clean, wet wash cloth to wipe the object away. If this does not work, seek immediate medical attention.

5.1.12 Important pointers to inform fire safety department about any near-miss incidents in the work place

The Basic
The specific location, time and date of the incident

The Affected
The name(s) of the individual(s) involved, their job title(s), the department(s) they operate in the manager(s) of those affected

The Witnesses
Speak to any witnesses of the event to record their perspective of the event in detail.

The Context
Consider and document the events that occured leading up to the incident.

The Action
In the report, you must specify the action of those involved at the time of the incident. What did the employed do that led to the incident?

The Environment
Was there indequate lighting? Was a piece of equipmets not operating properly? Was the employees visibility obstructed bt a glare/blind spot?

The Injuries
Record detailed descriptions of specific injuries and evaluate the severity of such in the report.

The Treatment
report the type of treatment administered for the acknowledged injuries, to understand how the employee recovers when reviewing the specifics of the event.

The Damages
Record an account of any damages to equipment, materials. etc that was affected by the incident.

Fig: 5.1.17 Important pointers to inform fire safety department about any near-miss incidents in the work place

5.1.13 Steps to write an incident report

4 STEPS TO WRITING A WORKPLACE INCIDENT REPORT

1
TAKE IMMEDIATE ACTION

Employees should notify their manager or another member of the company's leadership as soon as the incident occurs. Once an incident has been reported, the member of leadership' first responsibility is to ensure that appropriate treatment, if necessary, is being administered to those affected by the event.

2
COLLECT THE FACTS

Once the immediate action including the response to the event and eliminating the hazard from the environment has been conducted, determine and record the facts related to their incident. Facts can include.

3
ANALYZE AND REFLECT

Analyze and determine how and why the incident occurred in order to develop an effective action plan.

4
ESTABLISH A CORRECTIVE ACTION PLAN

A corrective action plan would provide recommendations as a mean to reduce the possibility of a continued issue and/or recurrence of the incident. The recommendation would result from an effective analysis of the facts collected and documented inn the incident report.

Fig: 5.1.18 Steps To write an incident report

The above steps can be written down in the form of a report, the form can be made in a similar manner.

Accident / Incident Report

This form is for Accidents and incidents involving injury or illness.

1. Status of Person Reporting: Employee ☐ Student ☐ Visitor ☐	2. Date of accident / incident (mm/dd/yyyy): ☐☐☐☐☐☐	3. Time of accident / incident: ☐ AM ☐ AM
4. Name: (Last, First, MI)		5. MU Number:
6. Address, City, State, Zip Code:	7. Cellular Telephone #:	a. Work Telephone #:
8. Address or location where accident / incident occurred: (Building, City)		
9. Specific location where accident / incident occurred: (Stairs, Loading Dock, Room or Lab #. Give direction for more detail - N,S,E,W)		
10. Nature of accident / incident:		
11. Cause of accident / incident:		
12. How and why did this incident occur: (Be as detailed as possible, use additional sheet(s) if necessary)		
13. Was this a WORK-RELATED accident / incident: Yes ☐ No ☐ If yes, Department/Office: Check the appropriate box: ☐Employee ☐Work Study ☐Graduate ☐Assistant ☐Other		
14. Was professional medical attention required or recommended for this injury/illness? Yes ☐ No ☐ If yes, a Workplace or Student / Visitor Injury Report Form or must be completed, see EH&S web site.		
15. Witnesses name, and contact information: (Use additional sheet(s) if necessary)		
16. Signature of Person Completing Report:		
17. Person Completing Report: (if other than above)	a. Title:	18. Date sent to Safety:
19. Telephone#:	a. E-mail:	
20. Detailed account of faculty member from responsible department:		
21. Corrective action taken by responsible department:		
22. Action taken by:		
23. Additional corrective action recommended:		
24. Additional corrective actions recommended by:		
25. Signature of Chair of the Department required to complete corrective actions:		
26. Date		

Fig: 5.1.19 Accident/Incident report

Exercise

Choose one option amongst the following and complete the sentence.

1. The terms "……." and "……." are often used interchangeably.
   a) Light and bright
   b) Hazard and risk
   c) Care and careful
   d) Right and write

2. **Occupational health and safety encompass the social, mental and physical well-being of workers that is the "……"**
   a) Complete person
   b) Single person
   c) Whole person
   d) Similar person

3. **"Poor working conditions of any type have the potential to affect a worker's health and ……"**
   a) Safety
   b) Personality
   c) Dignity
   d) Speed.

4. **Complete the sentence:**

   Values (such as ……
   ……
   ……
   …… (planned or not planned).

5. **State True and False**

   "The costs to employers of occupational accidents or illnesses are also estimated to be enormous." ☐ True ☐ False

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/aU1P7-Cn72s

Types of fire and fire extinguishers

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/xnZZruGjKBA

Classes of fire

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/3nakKzM66hk

Fire extinguishing agents

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/XmPnXzQVLQg

Clean agent fire suppression system

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/QEB7wE-YFXg

Personal protective equipment

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https://youtu.be/9igRiyURobE

How to use a fire extinguisher

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/aU1P7-Cn72s

Which fire extinguisher to be used on which class of fire

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/apwK7Y362qU

Know what to do during a fire

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/2V2FFQUfxj0 Types of safety

signs and symbols

Notes

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6. Annexure

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1	Module 2	Unit 2.1 Introduction to natural gas	2.1.7 Basic properties of flammable gas	39	https://youtu.be/nPXZhJP1EpM	Flammable vs. Combustible liquids
2	Module 2	Unit 2.2 Prepare for visiting the consumer's location	2.2.3 Tools and equipments required in gas meter reading activity	39	https://youtu.be/jH55BFl8tnI	How to use CMRI
3	Module 2	Unit 2.3 Visit consumer's premises to record gas meter reading	2.3.4 Procedure to read and record the gas consumption reading	39	https://youtu.be/WKnY0M0Ei94	How do I read my gas meter?
4	Module 2	Unit 2.3 Visit consumer's premises to record gas meter reading	2.3.10 PNG gas detectors for commercial & industrial kitchens	39	https://youtu.be/gIYBfv6dCZU	Checking for gas leaks in your home
5	Module 3	Unit 3.1 - Handle consumers and their queries	3.1.1 Effective communication	63	https://youtu.be/2Yw6dFQBklA	The art of effective communica-tion

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
6	Module 3	Unit 3.1 - Handle consumers and their queries	3.1.3 Constructive communication: listening skills	63	https://youtu.be/-BdbiZcNBXg	Being a good listener
7	Module 3	Unit 3.1 - Handle consumers and their queries	3.1.6 English greetings	63	https://youtu.be/_2rSsu84F50	Formal and informal greetings in English
8	Module 3	Unit 3.1 - Handle consumers and their queries	3.1.7 Customer relationship	63	https://youtu.be/9HUTcgykft8	Building rapport: customer service
9	Module 3	Unit 3.1 - Handle consumers and their queries	3.1.8 Ways of handling customer for 100% satisfaction	63	https://youtu.be/XK3cNcuvuMs	5 steps to improve customer satisfaction

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
10	Module 3	Unit 3.1 - Handle consumers and their queries	3.1.9 Safety tips, fire safety precautions while using piped natural gas, maintenance, response to gas emergencies	63	https://youtu.be/IXF6TKthWdI	What to do when you smell gas leak
11	Module 3	Unit 3.1 - Handle consumers and their queries	3.1.10 Handle customer complaints	63	https://youtu.be/T20hV4ynU7o	Dealing with customers training
12	Module 3	Unit 3.1 - Handle consumers and their queries	3.1.10 Handle customer complaints	63	https://youtu.be/WphIXqTp_es	Handling customer complaints: defusing frustration
13	Module 4	Unit 4.1 - Effective communication, feedback, and listening	4.1.5 Power of Teamwork	75	https://youtu.be/6fbE52YDEjU	Team work can make the dream work

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
14	Module 4	Unit 4.1 - Effective communication, feedback, and listening	4.1.6 Organizational Skills	75	https://youtu.be/fUXdrl9ch_Q	Good Teamwork and Bad Teamwork
15	Module 4	Unit 4.1 - Effective communication, feedback, and listening	4.1.6 Organizational Skills	75	https://youtu.be/9MO1aY1xC80	Motivation - leader and teamwork!
16	Module 4	Unit 4.1 - Effective communication, feedback, and listening	4.1.6 Conflict management	75	https://youtu.be/EDMY39JE1sY	5 steps to manage conflict between team members
17	Module 4	Unit 4.1 - Effective communication, feedback, and listening	4.1.6 Organizational Skills	75	https://youtu.be/H_vOfqIpD60	Why team building is important

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
18	Module 4	Unit 4.1 - Effective communication, feedback, and listening	4.1.6 Conflict management	75	https://youtu.be/WTa4wvFVX_Y	How to manage conflict in a team
19	Module 5	Unit 5.1 - Maintain health, safety and security procedures	5.1.5 Techniques of using the different fire extinguishers	112	https://youtu.be/aU1P7-Cn72s	Types of fire and fire extinguishers
20	Module 5	Unit 5.1 - Maintain health, safety and security procedures	5.1.5 Types of fire	112	https://youtu.be/xnZZruGjKBA	Classes of fire
21	Module 5	Unit 5.1 - Maintain health, safety and security procedures	5.1.5 Techniques of using the different fire extinguishers	113	https://youtu.be/3nakKzM66hk	Fire extinguishing agents
22	Module 5	Unit 5.1 - Maintain health, safety and security procedures	5.1.5 Techniques of using the different fire extinguishers	113	https://youtu.be/XmPnXzQVLQg	Clean agent fire suppression system

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
23	Module 5	Unit 5.1 - Maintain health, safety and security procedures	5.1.6 Use of personal protective equipments	113	https://youtu.be/QEB7wE-YFXg	Personal protective equipment
24	Module 5	Unit 5.1 - Maintain health, safety and security procedures	5.1.7 Different methods of extinguishing fire	113	https://youtu.be/9igRiyURobE	How to use a fire extinguisher
25	Module 5	Unit 5.1 - Maintain health, safety and security procedures	5.1.7 Different materials used for extinguishing fire materials	113	https://youtu.be/aU1P7-Cn72s	Which fire extinguisher to be used on which class of fire
26	Module 5	Unit 5.1 - Maintain health, safety and security procedures	5.1.9 Rescue techniques applied during a fire hazard	113	https://youtu.be/apwK7Y362qU	Know what to do during a fire
27	Module 5	Unit 5.1 - Maintain health, safety and security procedures	5.1.10 Various types of safety signs and what they mean	113	https://youtu.be/2V2FFQUfxj0	Types of safety signs and symbols

Notes

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