



SHROPSHIRE

Fire and Rescue Service

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**Brigade Order
Operations
14**

Part 6

**Incidents involving
gas installations**

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Part 6 – Incidents involving gas installations

Purpose

The purpose of this order is to outline the mobilisation and operational procedure for dealing with incidents that involve gas installations.

Strategic aims and objectives

This Brigade Order supports the following strategic aims:

Strategic Aim 1 “Reduce the risk to life and material loss from fire and other emergencies in the community”

Strategic Aim 2 “Protect life, property and the environment from fire and other emergencies”

Strategic Aim 3 “ Secure the highest level of safety and welfare for all staff by providing effective supervision, training, equipment and systems of work”

Roles, responsibilities and review

The Head of Operations is responsible for ensuring this Order is implemented across the Brigade.

Incident Commanders will be responsible for the day to day operation of the Order.

The Head of Operations will review this Order biennially in May and as and when organisational changes take place.

Introduction

Composition

Natural gas consists mostly of methane which is a light hydrocarbon. It also contains other gases in small quantities such as ethane, which is also a hydrocarbon and nitrogen which is an inert gas. Natural gas is a dry gas, which is lighter than air. Unlike the old town gas, which is no longer made in this country, these gases are all non-toxic.

Transmission and distribution of natural gas

Within the British mainland, National Grid (previously called Transco and before that British Gas) is responsible for the transmission and distribution of gas. National Grid owns and operates the National Transmission System throughout Great Britain and owns and operates a significant gas distribution network throughout the heart of England.



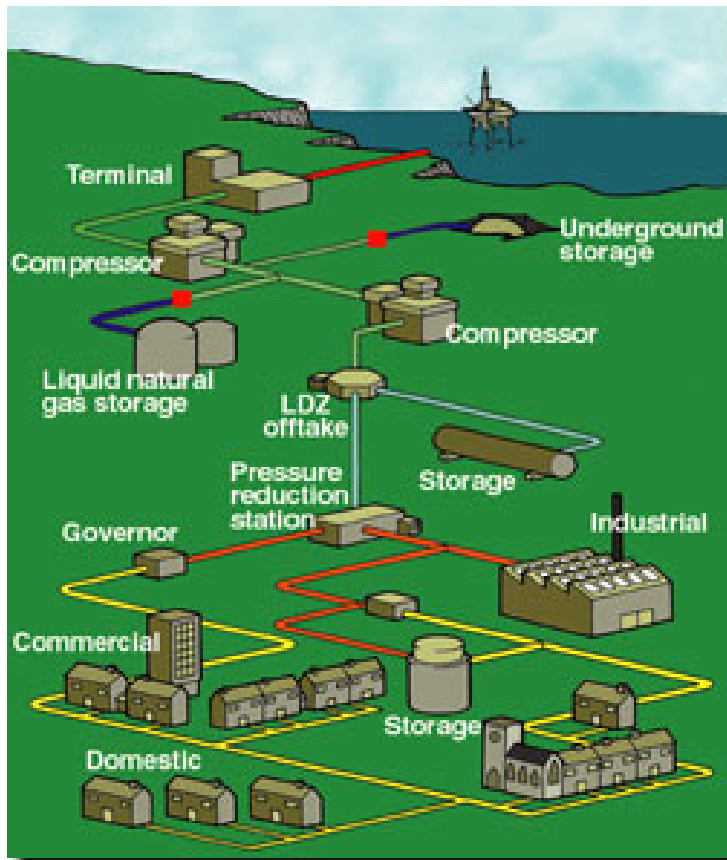
The National Transmission System (NTS) is the high pressure part of National Grid's transmission system and it consists of more than 6,600 Kilometres of top quality welded steel pipeline operating at pressures of up to 85 bar (85 times normal atmospheric pressure, over 1250 psi). The gas is pushed through the system using 26 strategically placed compressor stations. From over 140 off-take points, the NTS supplies gas to 40 power stations, a small number of large industrial consumers and the twelve Local Distribution Zones (LDZs) that contain pipes operating at lower pressure which eventually supply the consumer.

The twelve LDZs are managed within eight gas distribution networks. Following the sale by National Grid of four of the distribution networks, the owners of the distribution networks are now: North West, London, West Midlands and East of England. East Midlands LDZ & East Anglia LDZ are owned and managed by National Grid **(the area outlined in black)**

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Transportation

These high pressure pipelines that transport gas around the country are largely buried below ground, well outside towns and are designed to ensure maximum security of supply. Pressures and flows in the system are controlled by compressor installations and pressure reducing stations along its route. Pressure reducing stations consist of equipment installed to reduce the pressure on a pipeline, tunnelling or restricting the flow of gas from the National and Regional Transmission Systems into the distribution systems.



The pressure is reduced to 7 bar and below to feed gas from the national and regional transmission systems into the distribution system. The distribution system consists of over 200,000 km of pipes constructed of various materials including cast iron, ductile iron, plastic (polyethylene) and steel, of diameters ranging up to 4200mm. These pipes are called mains and are normally buried underground in roads and footpaths. Mains can, however, be constructed above ground to cross rivers and bridges.

Distribution mains operate at three different ranges of working pressure as follows:

- Low pressure** up to 75m bar
- Medium pressure** above 75m bar and up to 2 bar
- Intermediate pressure** above 2 bar and up to 7 bar

Most of the distribution system operates at low pressure and consists of cast iron mains. The majority of services are constructed from steel pipe up to 50mm diameter and supply domestic premises.

Generally, services of 63mm and larger are fitted with valves, normally located under a small metal cover in the footpath or elsewhere, to isolate the gas supply outside commercial, industrial and multi-storey premises. Such valves are operated by means of a valve key carried by distribution personnel.

On no account must these valves be operated by unauthorised personnel. If a valve has already been operated, National Grid should be contacted immediately, so that their personnel can carry out safety checks. After safety checks have been carried out, in the appropriate circumstances, the Region will restore the gas supply to the premises.



In cases where the customer's service is supplied from a main operating at a greater working pressure than 75m bar, a governor is fitted outside the premises. The service governor reduces the incoming gas to low pressure and has an automatic valve and relief vent fitted to ensure that high pressure will not occur at the inlet to the meter.

Preference is now given to fitting a meter box assembly which is built into the outside wall of the premises. The service is normally constructed of polyethylene and fits into a preformed sealed sleeve below ground level.

Pressure in the distribution system is controlled by installations called district governors. District governors consist of a series of pressure reducing devices, which reduce the inlet pressure to the desired pressure(s) on the outlet or downstream side. District governors are normally housed in kiosks or brickwork buildings, and are normally sited near intermediate or medium pressure mains and provide protection against over-pressurisation in the local distribution system.

Storage

One of the valuable properties of gas is that it can be stored for later use. When demand for gas is high, the demand may be higher than the amount of gas which is sent through the terminals at the coast. The extra demand is met from stored gas.

There are various types of gas storage available; some are listed below:

Gas which is stored and used seasonally (e.g. spring and summer)

- gas in underground cavities
- liquefied gas in above ground tanks.

Gas which is stored and used daily

- low pressure gas holders
- high pressure gas holders
- gas at high pressure in rows of pipes underground (pipe arrays)
- storage of gas at high pressure in transmission pipelines (transmission line pack).

A common form of storage encountered in the transmission system is the liquefied natural gas plant. These plants are normally sited at the ends of the transmission system and draw off gas at selected times from the transmission system and liquefy it.

The liquefied natural gas (LNG) plants provide a rapid response to re-vaporise gas into the transmission system when required. The LNG is normally stored above ground at temperatures of minus 165°C. Liquefaction allows 600 cubic metres of gas to be converted into one cubic metre of liquid.

The most common form of storage encountered in the distribution system is the low pressure gas holder. They are normally sited in or near towns and draw off/store gas during the night and help meet the demand for gas during the day. Low pressure holders store gas either in inverted cylindrical bells which are sealed in water or in the piston type waterless holders.

Escapes of natural gas

Sources of escapes

Gas can accumulate in a building as a result of leakage from one of the following sources.

Gas can escape from broken pipes, leaking joints, or corroded services, or can arise from direct interference by others, e.g. a mechanical evacuator digging up a service pipe. The gas may travel along telecommunications or electrical ducts, drain pipes, etc., through cavity walls or floors into buildings. Gas can be present in a building even if there is no gas supply to the premises.

There are still gas meters which are connected to service pipes by means of lead pipes. In the event of a fire these pipes are liable to melt and lead to an escape of gas. At present, new installations incorporate flexible steel pipe connectors, which have a greater resistance to heat.

On the pipework on the outlet side of the meter, (known as the internal carcassing), leakage can be caused by corrosion, fractures, fire damage, accidental damage such as driving a nail into a pipe, direct interference or faulty workmanship.

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Gas appliances occasionally malfunction or develop faults which can cause leakage of gas. Leakage can also occur due to appliances being installed by unauthorised personnel or abuse or direct interference by others.

For natural gas to burn there must be sufficient air present. If too much or too little air is present, then the mixture will not burn (termed the limits of flammability). The limits of flammability for natural gas are normally between 5 to 15% by volume of gas in air.

If a gas/air mixture builds up in a confined space, and an ignition source is present, a fire or explosion could result in severe building damage and serious injuries could occur. Gas supply companies have instruments to measure the gas concentration in a building and they will decide if immediate evacuation is necessary due to the build-up of gas inside the building.

Operational procedures for natural gas escape

- **Fires in buildings**

If the Fire and Rescue Service arrive first at the scene of the fire, it is important to close the customer meter control as soon as possible, even if leaking gas is not the source of the fire. After the fire has been extinguished, National Grid (or the British Gas local supply company) must be contacted, so that they can check the complete installation and, if satisfied, restore the gas supply.

On no account should the supply be restored by the customer or the Fire Brigade.

- **Gas escapes in buildings**

All escapes of gas should be notified immediately to the appropriate gas emergency centre via Fire Control. Precautions should be taken to ensure that nobody is smoking and hand torches etc., are switched on prior to entering the buildings. Do **not** switch off the hand torch until leaving the building. (Fire Service personnel should use the intrinsically safe torches provided for use with BA).

Turn off the customer meter control

Extinguish all naked flames.

Open all windows and ventilate the building.

Do not operate any electrical switches **on or off**, including door bells and telephones.

Avoid, if possible, turning off any gas appliance taps as this could hamper any subsequent investigations by local gas company officials.

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- **Gas escapes outside premises**

Fires

It is generally recommended that fire involving gases such as natural gas should not be put out until the supply source has been shut off. However, in the event of a fire which places people in danger directly or through failures of equipment, it may be necessary to extinguish the fire immediately. Currently the most successful extinguishing agents for natural gas fires are dry powder or carbon dioxide. If this is done then all efforts must be made to disperse the subsequent gas leak by using jets on fog setting and PPV where available.

- **Gas escapes on the distribution system**

An emergency centre is operated by National Grid throughout the year, twenty-four hours a day. Arrangements are made for supervisory staff to be called out in the event of unusual incidents. The distribution teams will decide whatever actions are necessary upon their arrival at site.

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