Petroleum and Gas Inspectorate

Guideline for activities using fuel gas to produce theatrical or other special effects

2017

Queensland Government

This publication has been compiled by the Petroleum and Gas Inspectorate of the Department of Natural Resources and Mines.

Table of contents

Summary

The Petroleum and Gas Inspectorate (the Inspectorate) of Department of Natural Resources and Mines (DNRM) regulates safety in the petroleum and fuel gas industry in Queensland under the *Petroleum and Gas (Production and Safety) Act 2004* (the Act).

An activity involving the use of fuel gas[1] to produce theatrical or other special effects is regulated under the Act. These activities are prescribed as operating plant[2] and must be conducted under a Safety Management System.

A gas device utilised during the activity of producing a theatrical or other special effect is defined as a gas device Type B[3].

In Queensland, all gas devices and gas fittings must be approved by the Chief Inspector Petroleum and Gas, or a person or body approved by the Chief Inspector[4]. Being a place or activity defined as operating plant does not negate the requirement for any associated gas devices and/or gas fittings to be approved.

Purpose

This guideline has been developed to help operators of gas fuelled theatrical or other special effects ensure compliance and minimise risks. It should be noted that due to the rapid growth in technology and variety of gas equipment, this guideline may not be appropriate for every gas fuelled theatrical or other special effect activity.

Activity description

Activities involving the use of fuel gas to produce theatrical or other special effects include, but are not limited to:

- simulating fire, flames and/or explosions as part of a theme park thrill ride or show
- simulating fire, smoke or emergency incidents for training purposes
- producing explosions and flames as part of a music event or theatrical production
- producing celebratory flares/flames such as at sporting events.

The activity can be further subdivided into gas devices and equipment that is:

- Fixed (installed), meaning they are connected to a gas system at a theme park or training centre
- Portable, meaning they have a self-contained fuel gas supply or they are connected to an LP gas cylinder by a hose assembly and are moved from location to location.

The definition of an ‘activity’ using fuel gas to produce theatrical or other special effects (operating plant) **does not** include the installation of the gas system at a theme park or training centre. However, the activity **does** include:

- device and equipment design, construction, installation and use
- handling and storage of the associated fuel gas
- equipment operation and maintenance
- operator and staff training and competence
- separation distances and exclusion zone determination
- emergency and incident preparedness.

[1] Act 11(2)
[2] Regulation 10(3)(b)
[3] Act 724
[4] Act 733

The term ‘installation’ in this guide, means to set in position, connect the fuel gas supply and prepare for use.

Safety Management System

The Safety Management System (SMS) for the operating plant must meet the requirements of the Act. The SMS must:

- contain all information relevant to the gas system and the activity being undertaken
- identify relevant hazards, assess and manage risks
- identify exclusion zones, emergency equipment and evacuation routes
- detail operating procedures for the activity including emergency management
- specify any roles, responsibilities and training requirements.

The SMS for the activity may form part of the broader SMS developed by the individual or corporation for their business or undertaking. provided there is sufficient detail to effectively manage the operating plant activity as required under the Act.

The Inspectorate’s audit tool, SafeOP, is available on the department’s website and can help operators ensure they comply with the requirements for a SMS.

Statutory positions

As part of an effective SMS, there are certain statutory positions and obligations which must be fulfilled. The statutory positions and their obligations include:

- *Executive safety manager*[5], this is the individual or senior executive of a corporation responsible for the management and safe operation of the operating plant. The Executive safety manager must:
    - appoint an appropriately qualified person as the operator
    - ensure the operator has developed and implemented a safety management system
    - approve the safety management system before it is implemented
    - provide an annual safety report before 1 September each year.
- *Operator*[6], is the individual who has overall responsibility for the management and safe operation of the operating plant. In the case of an activity using fuel gas to create theatrical or other special effects, this is usually a manager or supervisor but could be the person actually operating the device. The operator of the plant must:
    - appoint an appropriately qualified person as the site safety manager for the plant
    - ensure a notice is provided to the Chief Inspector prior to commissioning or operating the plant for the first time in Queensland
    - develop and implement a SMS for the plant.
- *Site Safety Manager*[7], if no one has been appointed as the site safety manager, the operator is the site safety manager by default. The site safety manager must ensure[8]:
    - an appropriate induction is given to each person who interacts with the plant
    - each person complies with the requirements of the safety management system
    - each person performs their functions safely and follows standard operating procedures
    - necessary first aid, safety and other related equipment is available and maintained
    - staff are suitably trained in first aid, emergency and other general safety procedures.

[5] Act 687
[6] Act 673
[7] Act 694
[8] Act 693

Commissioning notice

The operator must give the Chief Inspector written notice 20 days before the scheduled commissioning of the gas equipment or conducting the associated activity[9] for the first time in Queensland. A guide to commissioning notice requirements is available online.

Reporting prescribed incidents

As operating plant, any incident relating to the activity must be reported to the Chief Inspector Petroleum and Gas[10]. A guide to reporting requirements is available online.

To encourage better safety practices, the department provides safety alerts, safety instructions and other safety news online.

Annual safety report

The operator of gas fuelled theatrical or special effects must provide an annual safety report before 1 September each year[11]. Information on the content requirements and how to lodge the annual safety report is available online.

Safety and health fee

The operator of a gas system that uses fuel gas to produce theatrical or other special effect must pay an annual safety and health fee[12]. More information on the safety and health fee is available online.

Gas fuelled theatrical or other special effects not used for amusement or entertainment whether installed or portable, are not subject to the fee. An example where the fee would not apply would be gas fuelled fire-fighting or emergency response training equipment.

Gas system design, approval and installation

Device design

The person designing, constructing or importing gas fuelled devices, plant or equipment that produce theatrical and other special effects should make all attempts to ensure compliance with the relevant safety requirement, these include:

- AS3814 Industrial and commercial gas-fired appliances
- AS1375 Industrial fuel fired appliances
- AS3645 Essential requirements for gas equipment
- AS60079 Explosive atmospheres (all relevant parts)
- AS61508 Functional safety of electrical / electronic / programmable electronic safety related equipment – (all relevant parts)
- AS/IEC Functional Safety – safety instrumented systems for the process industry sector – (all relevant parts)

[9] Act 673A
[10] Act 706
[11] Act 689
[12] Regulation Schedule 9 Pt 8 15

The person should consider and reference where appropriate the following overseas standards:

- NFPA 160 - Standards for the Use of Flame Effects Before an Audience
- NFPA 1402 - Guide to building fire service training centres.

Whether the device is being constructed here in Australia or imported, once the design and construction details have been established, all technical and other relevant information should be documented in a Technical Submission (Submission). The technical contents of the Submission should include:

- device design information, specifications and calculations as listed in Appendix A of AS3814
- device installation, ventilation and fluing information with references to AS/NZS5601
- any LP Gas storage and supply information with references to AS/NZS1596
- Original Equipment Manufacture specifications for component parts
- operating instructions of the device
- maintenance instructions for the device.

In addition to the technical information, due to the definition as operating plant, the Submission should be accompanied by all relevant information from the SMS. This additional information may include:

- a risk assessment, documenting the appropriateness of the SMS
- qualifications and experience of persons installing, operating and maintaining the device
- required exclusion zones around device for operation (staff and public)
- information related to any Notice provided to the Chief Inspector in relation to the device design, construction or proposed installation.

When complete the Submission should be provided to a Type B Approving Authority that has 'uncommon' gas devices within the scope of their approval under s733 of the Act.

Portable gas devices

Where the gas device is portable in nature, and is relocated from one event to another, any related LP gas cylinder shall be considered to be an integral part of the device. Information in the Submission must detail the appropriate physical size and capacity of the cylinder. Quantities should be kept to a minimum, lessening the adverse effect of an unforeseen event. In addition, storage and handling considerations that protect the device when in transit should be included in the Submission.

Device approval

In Queensland, all gas devices and gas fittings must be approved prior to the supply, installation or use[13]. Persons who undertake the approval of Type B gas devices are known as Type B Approving Authorities. Type B Approving Authorities are approved by the Chief Inspector in relation to particular device classifications. A gas device Type B that produces a theatrical or other special effect is classified as 'uncommon'. Approvals of these devices must only be made by an Approving Authority that has 'uncommon' devices within their scope.

Gas devices utilised for the production of a theatrical or other special effect are not exempt from the Type B approval process. However, due to the complexity and diversity of device design the contributing factors and the assessment process may differ from the norm.

The process should involve the development of a Submission during the design stage, or when the operator first takes possession of an imported device. The Submission should include all technical specifications in relation to gas firing matters. This may include information about gas storage and piping, gas isolation and safety shut off valves, flame ignition systems, flame supervision systems, surface and radiated temperatures. Where possible efforts should be made to ensure these comply

[13] Act 733

with the appropriate safety requirement as listed in the design section of this document and schedule 1 of the Regulation.

In addition to the technical content of the Submission the Approving Authority will need to have an understanding of the appropriateness of the applicable SMS.

The approval of gas devices that produce a theatrical or other special effect may rely on the supporting information form the SMS concerning who operates them, where they are operated and when they are operated.

More information on the Type B gas device approval process is available on the DNRM website.

Alternative means of compliance for device design

It is acknowledged that in a number of cases, direct compliance to AS3814 will not be possible. In these instances, an alternative means of compliance must be applied that ensures the level of risk is equal to or less than would be achieved by complying with the standard[14]. In these cases, the Chief Inspector Petroleum and Gas must be notified in writing prior to installation and commissioning. The notice must include:

- details of the non-compliance
- a statement that there is evidence of an equal or lesser level of risk (a report setting out a risk assessment carried by a competent person)
- an acknowledgement that the evidence will be made available to an inspector if requested.

Further information on the process under section 7 of the Regulation is available online.

It should be noted that the process cannot be used to justify non-compliance after the fact.

Fixed gas system installation

A fixed gas system, at a theme park or fire-fighting training centre, refers to the gas system from the gas supply point (meter, tank or cylinder) to the theatrical or other special effect device isolation valve. This type of gas system is not considered to be part of the operating plant (activity) and should be designed, installed and commissioned by the holder of a Gas Work Licence or Gas Work Authorisation.

The installer should ensure the design and installation complies with AS/NZS5601.1 Gas installations Part 1 General Installations. On completion, the installer should issue a Gas System Compliance Certificate[15] to the gas system owner and the gas supplier. The person should also affix a Gas System Compliance Plate for the gas system[16] as required.

Alternative means of compliance for the installation

In general terms, it should be within the scope of AS/NZS5601 to design and install a compliant gas system. However, in cases where it is not possible to comply, an alternative means of compliance must be applied that ensures the level of risk is equal to or less than would be achieved by complying with the standard[17]. In these cases, the Chief Inspector Petroleum and Gas must be notified in writing prior to installation and commissioning.

[14] Regulation 7(4)(b)
[15] Act 734(3)(a) and 91A(2)
[16] Act 734(3)(b) and 91B
[17] Regulation 7(4)(b)

The notice must include:

- details of the non-compliance
- a statement that there is evidence of an equal or lesser level of risk (a report setting out a risk assessment carried by a competent person)
- an acknowledgement that the evidence will be made available to an inspector if requested.

Further information on the process under section 7 of the Regulation is available online.

It should be noted that the process cannot be used to justify non-compliance after the fact.

Further information

If you would like more information please contact the Petroleum and Gas Inspectorate.

It must be remembered that the Inspectorate only regulates the activity of using a fuel gas to produce theatrical or other special effects. Companies and organisations will have obligations under other agencies and legislation such as the Explosive Inspectorate and Workplace Health and Safety.

Appendix 1 - Frequently Asked Questions

Why is an activity that uses fuel gas to produce a theatrical or other special effects defined as operating plant?

Gas fuelled plant and equipment designed, constructed and operated to produce theatrical or other special effects or to simulate fire for training purposes present an elevated level of risk due to the interaction of operators, trainees and/or the proximity to the public.

Why do I need a safety management system?

Defining the activity of using a fuel gas to produce a theatrical or other special effect requires the operator to develop, implement and maintain an appropriate safety management system that identifies related hazards and effectively manages the associated risks.

What is a safety management system?

A safety management system is a document that identifies the details of an operating plant to the extent that they are appropriate to the plant. In the case of an activity that uses fuel gas to produce theatrical or other special effects, the safety management system may be part of the larger organisational safety management system provided the requirements for a safety management system are met as prescribed under section 675 of the Act. The SMS must:

- contain all information relevant to the gas system and the activity being undertaken
- identify relevant hazards, assess and manage risks
- identify exclusion zones, emergency equipment and evacuation routes
- detail operating procedures for the activity including emergency management
- specify any roles, responsibilities and training requirements.

Do I need to pay the safety and health fee?

Yes, operators of an activity that uses fuel gas to produce theatrical or other special effect for amusement or entertainment are required to pay an annual safety and health fee. There is a further requirement to lodge a safety and health fee return which must state the number of gas systems operated by the person, the number of times they were operated and the amount of fuel gas used. A system can be a combination of devices utilised for a theatrical or special effect.

In the case of gas fuelled fire-fighting or emergency response training equipment the fee would not apply.

Further information about the fee is available on our website.

How much is the fee and what does it pay for?

The current fee is prescribed under Schedule 9, Part 8 section 15 of the Regulation and the current fees can be found online. The safety and health fee covers the cost of the department's regulatory activities in relation to operating plant each year.

Who is the executive safety manager?

The executive safety manager is, if the operator is an individual—the operator; or the senior managing officer of the corporation or organisation responsible for the management and safe operation of the operating plant.

Who is the operator?

The operator is the person who has overall responsibility for the management and safe operation of the operating plant. In the case of a theatrical or special effect this may not be the person physically charged with operating the device, it is more likely to be the company owner or manager.

Who is the site safety manager?

The operator must appoint a suitably qualified and experienced person as the operator. If no-one has been appointed as the site safety manager for a site at an operating plant, the operator of the plant is the site safety manager for the site.

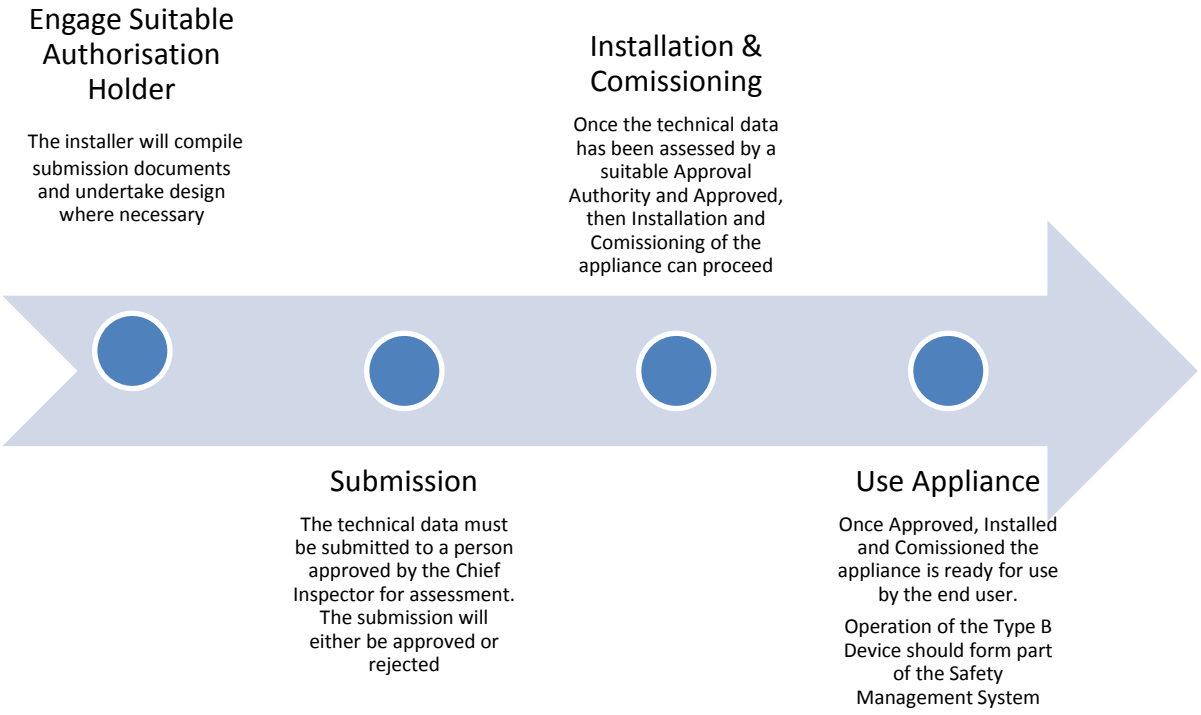
Does the operator need to provide a commissioning notice each time a portable device is relocated?

No, the operator needs to provide a commissioning notice the first time the device is operated in Queensland. The notice should be provided to the Chief Inspector 20 days prior to commissioning or operating the plant or equipment.

Does a gas device that produces a theatrical or special effect require Type B approval in Queensland?

Yes, in Queensland all gas devices and gas fittings must be approved before supply, installation and use. The approval can only be undertaken by the Chief Inspector, or a person approved by the Chief Inspector.

Gas devices used, design or intended to produce heat, light or power by using a fuel gas are defined as a gas device (type A) or a gas device (type B). Gas devices that create a theatrical or special effects produce light (flames) and power (heat and sound). Gas devices (type A) are prescribed in schedule 6 of the Regulation, any gas device not prescribed as a gas device (type A) is a gas device (type B). This may include a gas device (Type A) used outside its approved use.



Does a portable gas device need to be re-approved each time it is used/moved?

No, once approved the portable device remains approved until an alteration, modification or upgrade is undertaken. This would include any changes to the safety management system and any changes of staff operating the device.

Does the installer need to certify a portable theatrical or special effect each time moved to an event?

Yes, as operating plant, s697 requires the installer to certify the installation complies with all relevant safety requirements. A relevant safety requirement could be considered to be any and all exclusion zones, conditions of operation or other safety requirements required by the safety management system.

Further, completing a 697 Certificate notifies the Inspectorate of the intended activity at the event and allows appropriate audit and inspection scheduling. These can be lodged online.

Who can install, maintain or repair a gas fuelled theatrical or other special effect?

As this type of gas fuelled plant and equipment is defined as operating plant this work should be undertaken by a person assessed as competent in the scope of work as defined under the safety management system. Evidence of competence could be taken to be the holder of a Gas Work Authorisation or a person trained by the original equipment manufacturer and working in line with a documented procedure.