
Natural gas — Odorization

Gaz naturel — Odorisation

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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
3.1 General.....	1
3.2 Specific definitions for the gas odorants.....	2
4 General requirements for natural gas odorants	2
5 General remarks on odorant behaviour	2
5.1 Seals and membranes.....	2
5.2 Pipelines.....	2
5.3 Buried pipeline.....	3
6 Safety precautions	3
6.1 Handling of odorants.....	3
6.2 Masking and remediation.....	3
6.3 Transportation and storage.....	4
7 Odorization technique	4
7.1 Centralized or decentralized odorization.....	4
7.2 Odorizer.....	5
7.3 Constructional measures.....	6
7.4 Pressure resistance.....	6
7.5 Addition of odorant.....	7
8 Necessary odorant addition	7
8.1 General remarks.....	7
9 Control of odorization	8
9.1 General.....	8
9.2 Check of odorization equipment and systems.....	8
9.3 Control of odorization of the gas.....	8
9.4 Odour complaints.....	8
Bibliography	9
National standards or regulations	10

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 193, *Natural gas*.

ISO/TR 16922 cancels and replaces ISO/TS 16922:2002, [16922:2013](https://standards.iteh.ai/catalog/standards/sist/eedc2e9a-c6c7-46d8-9a55-cd2f8c3e23f6/iso-tr-16922-2013)

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Introduction

Processed natural gas normally has little or no odour. For safety reasons, distributed natural gas should therefore be odorized, to permit the detection of the gas by smell.

The odorization is predominantly a safety measure for the user of natural gas. Odorized natural gas is recognized by the characteristic smell.

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Natural gas — Odorization

1 Scope

This Technical Report gives the specifications and guidelines for the methods to be used in the odorization of natural gas under a safety point of view.

This Technical Report also specifies the principles for the odorization technique (including handling and storage of odorants) and the control of odorization of natural gas.

This Technical Report does not cover odorization of gas supply with gases other than natural gas.

NOTE The general requirements for odorants, and the physical and chemical properties of commonly used odorants are specified in ISO 13734.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5492:2008, *Sensory analysis — Vocabulary*

ISO 10715, *Natural gas — Sampling guidelines*

ISO 13734, *Natural gas — Organic components used as odorants — Requirements and test methods*

ISO 14532, *Natural gas — Vocabulary*

ISO 19739, *Natural gas — Determination of sulfur compounds using gas chromatography*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5492 and ISO 14532 and the following apply.

3.1 General

The following general definitions apply to the human ability for sensation, awareness and intensity of odour perception.

3.1.1

odour perception

awareness of the effect of volatile substances by the olfactory organ

3.1.2

odour character

distinctive and identifiable feature of an odour or flavour

3.1.3

odour intensity

magnitude of the perceived odour

3.1.4

sensory fatigue

form of sensory adaptation in which a decrease in sensitivity occurs

[SOURCE: ISO 5492:2008]

3.1.5

masking of odours

phenomenon where one quality within a mixture obscures one or several other qualities present

Note 1 to entry: The qualities may be odour intensity or character.

3.2 Specific definitions for the gas odorants

3.2.1

olfactory degree

measure of the odour intensity in accordance with a general law established by Weber, Fechner and Stevens, which is proportional to the logarithm of the odorant concentration

3.2.2

odorant content

content of the odorant either in the gas or in air, expressed as its mass concentration, volume fraction or mole fraction

3.2.3

odour intensity curve

correlation curve of odour intensity versus odorant concentration in air

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Note 1 to entry: The odour intensity of an odorant for natural gas or a gas can only be determined by the human olfactory organ.

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4 General requirements for natural gas odorants

Requirements for compounds used as natural gas odorants are given in ISO 13734.

Information about different odorants is given in informative Annex A of ISO 13734.

5 General remarks on odorant behaviour

5.1 Seals and membranes

Liquid odorants may cause severe swelling or even dissolution of organic materials such as plastics, elastomeric seals and lubricants. Therefore in odorization equipment and for joints close to the points where the liquid odorant is injected into the line, only sealing materials should be used which are compatible with liquid odorants. According to ISO 13734 this information should be supplied by the manufacturer of the odorant.

5.2 Pipelines

The low odorant concentrations used for odorization of natural gas and thus their low partial pressures do not compromise the integrity of plastic pipes, seals or diaphragms in gas transportation, distribution and utilization.

When starting gas distribution through new gas lines or when changing the odorant it may take some time to reach the required odorant concentration at the end of the line. This may result from the odorant being sorbed on the pipe wall, by pipe dust, rust and incrustations or by gas condensates (odour fading). The degree of sorption depends on several factors, for example the condition of the pipe grid, the pressure, the temperature, the flow velocity and the physico-chemical properties of odorants.

5.3 Buried pipeline

Odorized gases leaking from gas lines in the ground may lose odorants by sorption in the soil. Sorption and oxidation of odorants may vary with moisture content and the type of soil. Degradation of odorants by microorganisms may also occur.

6 Safety precautions

6.1 Handling of odorants

WARNING — Special care should be taken when handling odorants according to their actual characteristics and prevailing regulations.

Odorants are irritating, harmful and flammable. Therefore the specific material safety data sheet should be read prior to handling liquid odorants. All safety precautions should be strictly observed and followed. A minimum level of safety may be achieved by the following recommendations:

- Concentrated vapours of odorants may cause short-term acute health problems, such as dizziness, headache, nausea and irritation of throat, nose and eyes. Therefore protection, for example with a filter containing activated charcoal or a respirator, should be used. Any extended exposure without respiration protection should be avoided.
- When handling odorants, suitable personal protective equipment (eye-, face-, body-protection, gloves) and safe-handling procedures of the odorant are recommended. If, in spite of the use of personal protection equipment, liquid odorant contacts the skin or the eyes, wash the affected spot as first aid, immediately with plenty of water. If an eye comes in contact with liquid odorant, consult a physician immediately.

6.2 Masking and remediation ISO/TR 16922:2013

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WARNING — Do not bring undiluted oxidants into contact with odorants: RISK OF EXPLOSION!

There are several possibilities to eliminate the nuisance caused by the strong odour of spilled odorants.

- For masking of odours, deodorants may be used, which normally do not change the chemical properties of the odorant. Therefore health risks will not be eliminated. For larger amounts of spilled odorants these masking compounds are not suitable.
- Minor quantities of spilled odorants can be oxidized to less smelling compounds utilizing a procedure incorporating the spraying of diluted solutions of an oxidant such as 5 % by mass of sodium hypochlorite or 5 % by mass of hydrogen peroxide, preferably under the addition of detergents. This procedure should take into account the corrosive and reactive nature of these oxidants, which can lead to heat and pressure built-up.
- Larger quantities of spilled or leaked odorants should be sorbed by sorbents (e.g. sand, non-flammable chemical sorbent) and disposed of in tightly shut containers. Small remainders should be treated as minor quantities.

These sorbents or soil contaminated by odorants should be treated according to prevailing regulations.

Commercial products are also available to mask and/or mitigate odorant spillage. These products are generally available through the odorant manufacturer.

For the cleaning of pipework, containers and parts of the odorizing equipment the use of alcohols (isopropanol, technical ethanol) is an option. The used cleaning solution should be disposed according to prevailing regulations.