SLOVENSKI STANDARD
SIST EN ISO 13686:2005

01-julij-2005

Zemeljski plin ï Oznaļ evanje kakovosti (ISO 13686:1998)

Natural gas - Quality designation (ISO 13686:1998)

Erdgas - Bestimmung der Beschaffenheit (ISO 13686:1998)

Gaz naturel - Désignation de la qualité (ISO 13686:1998)

Ta slovenski standard je istoveten z: EN ISO 13686:2005

ICS:

75.060 Zemeljski plin Natural gas

SIST EN ISO 13686:2005 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 13686

May 2005

ICS 75.060

English version

Natural gas - Quality designation (ISO 13686:1998)

Gaz naturel - Désignation de la qualité (ISO 13686:1998)

This European Standard was approved by CEN on 17 April 2005.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

The text of ISO 13686:1998 has been prepared by Technical Committee ISO/TC 193 "Natural gas" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 13686:2005 by CMC.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 13686:1998 has been approved by CEN as EN ISO 13686:2005 without any modifications.

INTERNATIONAL STANDARD

ISO 13686

First edition
1998-05-01

Natural gas — Quality designation

Gaz naturel — Désignation de la qualité

Reference number
ISO 13686:1998(E)

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X.400 c=ch; a=400net; p=iso; o=isocs; s=central

Printed in Switzerland

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 13686 was prepared by Technical Committee ISO/TC 193, *Natural gas*.

Annexes A to H of this International Standard are for information only.

Introduction

The need for an International Standard concerning the designation of natural gas quality was a basic reason for the establishment of ISO/TC 193 in 1989. Standardisation of the designation of quality is specifically stated in the scope of the TC. Natural gas, supplying 20 % of the world's primary energy, is likely to increase its market share greatly. Yet there is currently no generally accepted definition of natural gas quality.

To meet this need, it was decided that a general statement of the parameters (i.e. components and properties) required should be established and that the resulting International Standard would not specify values of, or limits for, these parameters.

Furthermore, it was decided that general-purpose natural gas transmitted to local distribution systems (LDS), referred to as "natural gas", should be the first consideration. Thus, this International Standard was developed. Informative annexes are attached as examples of actual natural gas quality specifications that already exist.

This International Standard does not impose any quality restrictions on raw gas transported via pipelines or gathering systems to processing or treating facilities.

It should be understood that this International Standard covers natural gas at the pipeline level prior to any treatment by LDS for peakshaving purposes. This covers the vast percentage of the natural gas that is sold in international trade and transmitted for custody transfer to local distribution systems.

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Natural gas — Quality designation

1 Scope

This International Standard specifies the parameters required to describe finally processed and, where required, blended natural gas. Such gas is referred to subsequently in this text simply as "natural gas".

The main text of this standard contains a list of these parameters, their units and references to measurement standards. Informative annexes give examples of typical values for these parameters, with the main emphasis on health and safety.

In defining the parameters governing composition, physical properties and trace constituents, consideration has also been given to existing natural gases to ensure their continuing viability.

The question of interchangeability is dealt with in annex A clause A.2.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 6326-1:1989,	*Natural gas - Determination of sulfur compounds - Part 1: General introduction.*
ISO 6326-2:1981,	*Gas analysis - Determination of sulphur compounds in natural gas - Part 2: Gas chromatographic method using an electrochemical detector for the determination of odoriferous sulphur compounds.*
ISO 6326-3:1989,	*Natural gas - Determination of sulfur compounds - Part 3: Determination of hydrogen sulfide, mercaptan sulfur and carbonyl sulfide sulfur by potentiometry.*
ISO 6326-4:1994,	*Natural gas - Determination of sulfur compounds - Part 4: Gas chromatographic method using a flame photometric detector for the determination of hydrogen sulfide, carbonyl sulfide and other sulfur-containing odorants.*

ISO 6326-5:1989,	*Natural gas - Determination of sulfur compounds - Part 5: Lingener combustion method.*
ISO 6327:1981,	*Gas analysis - Determination of the water dew point of natural gas - Cooled surface condensation hygrometers.*
ISO 6568:1981,	*Natural gas - Simple analysis by gas chromatography.*
ISO 6570-1:1983,	*Natural gas - Determination of potential hydrocarbon liquid content - Part 1: Principles and general requirements.*
ISO 6570-2:1984,	*Natural gas - Determination of potential hydrocarbon liquid content - Part 2: Weighing method.*
ISO 6570-3:1984,	*Natural gas - Determination of potential hydrocarbon liquid content - Part 3: Volumetric method.*
ISO 6974:1984,	*Natural gas - Determination of hydrogen, inert gases and hydrocarbons up to* C_8 *- Gas chromatographic method*
ISO 6975:1997,	*Natural gas - Extended analysis - Gas chromatographic method.*
ISO 6976:1995,	*Natural gas - Calculation of calorific values, density, relative density and Wobbe index from composition.*
ISO 10101-1:1993,	*Natural gas - Determination of water by the Karl Fischer method - Part 1: Introduction.*
ISO 10101-2:1993,	*Natural gas - Determination of water by the Karl Fischer method - Part 2: Titration procedure.*
ISO 10101-3:1993,	*Natural gas - Determination of water by the Karl Fischer method - Part 3: Coulometric procedure.*
ISO 10715:1997,	*Natural gas - Sampling.*
ISO 11541:1997,	*Natural gas - Determination of water content at high pressure.*
ISO 12213-1:1997,	*Natural gas - Calculation of compression factor - Part 1: Introduction and guidelines.*
ISO 13443:1996,	*Natural gas - Standard reference conditions.*

3 Definitions

For the purposes of this International Standard, the following definitions and explanations apply.

3.1 natural gas

A gaseous fuel obtained from underground sources and consisting of a complex mixture of hydrocarbons, primarily methane, but generally also including ethane, propane and higher hydrocarbons in much smaller amounts. It generally also includes some inert gases, such as nitrogen and carbon dioxide, plus minor amounts of trace constituents.

Natural gas remains in the gaseous state under the temperature and pressure conditions normally found in service.
It is produced by processing raw gas or from liquefied natural gas and, if required, blended to give a gas suitable for direct use.
As pipeline quality natural gas it may then be transmitted within a local distribution system, within a country, or across national borders. It is subject to contractual requirements between buyer and seller, and in some cases to national or state requirements as to quality (see annex A, clause A.1).

3.2 liquefied natural gas

Natural gas which, after processing, has been liquefied for storage or transportation purposes. Liquefied natural gas is revapourized and introduced into pipelines for transmission and distribution as natural gas.

3.3 substitute natural gas

Manufactured or blended gas with properties which make it interchangeable with natural gas. Substitute natural gas is sometimes called synthetic natural gas.

3.4 raw gas

Unprocessed gas taken from well heads through gathering lines to processing facilities.

3.5 local distribution system

The gas mains and services which supply natural gas directly to consumers.

3.6 gas quality

The quality of a natural gas is defined by its composition and the following physical properties:

Major components:	calorific value, Wobbe index
Minor components:	density, compression factor
Trace constituents:	relative density, dew points

3.7 reference conditions

The preferred reference conditions are referred to as standard reference conditions and denoted by the subscript "s" (see ISO 13443):

p_s = **101,325 kPa**

T_s = **288,15 K**

3.8 calorific values

Divided into two types: superior calorific value and inferior calorific value, defined as follows (see ISO 6976).

3.8.1 superior calorific value

The amount of heat which would be released by the complete combustion in air of a specified quantity of gas, in such a way that the pressure at which the reaction takes place remains constant, and all the products of combustion are returned to the same specified temperature as that of the reactants, all of these products being in the gaseous state except for water formed by combustion, which is condensed to the liquid state at the above mentioned temperature. The above mentioned pressure and temperature must be specified.

3.8.2 Inferior calorific value

The amount of heat which would be released by the complete combustion in air of a specified quantity of gas, in such a way that the pressure at which the reaction takes place remains constant, and all the products of combustion are returned to the same specified temperature as that of the reactants, all of these products being in the gaseous state. The above mentioned pressure and temperature must be specified.

Both superior and inferior calorific values, which differ by the heat of condensation of water formed by combustion, can be specified on a molar, mass or volumetric basis. For the volumetric basis the pressure and temperature shall be stated at standard reference conditions.

Calorific values can also be stated as dry or wet, depending on the water vapour content of the gas prior to combustion.

The effect of water vapour on the calorific values, either directly measured or calculated, is described in annex F of ISO 6976.
Normally, the calorific value is expressed as the superior, dry value specified on a volumetric basis under standard reference conditions.

3.9 density

The mass of a gas divided by its volume at specified pressure and temperature.

3.10 relative density

Often called specific gravity, it is the mass of natural gas, dry or wet, per unit volume divided by the mass of an equal volume of dry air, both at the same specified pressure and temperature (see ISO 6976).

3.11 Wobbe index

The Wobbe index is a measure of the heat input to gas appliances, derived from the orifice flow equation. It is defined as the specified calorific value, always on a volume basis, divided by the square root of the corresponding relative density. The heat input for different natural gas compositions is the same if they have the same Wobbe index and are used under the same gas pressure (see ISO 6976).

3.12 compression factor

The compression factor Z is the quotient of the volume of an arbitrary mass of gas, at a specified pressure and temperature, and that of the same gas under the same conditions as calculated from the ideal gas law.

The terms compressibility factor and *Z*-factor are synonymous with compression factor (see ISO 12213-1).

3.13 water dew point

The dew point defines the temperature above which no condensation of water occurs at a specified pressure. For any pressure lower than the specified pressure there is no condensation at this temperature
(see A.4.1 and ISO 6327).

3.14 hydrocarbon dew point

The dew point defines the temperature above which no condensation of hydrocarbons occurs at a specified pressure.
At a given dew point, there is a pressure range within which condensation occurs except at one point, the cricondentherm (see A.4.2).

3.15 molar composition

The molar composition of a gas is the term used when the proportion of each component is expressed as a molar (or mole) fraction, or molar (mole) percentage, of the whole.
Thus the mole fraction, x_i, of component *i* is the quotient of the number of moles of component *i* and the number of moles of the whole mixture present in the same arbitrary volume. One mole of any chemical species is the amount of substance which has the relative molecular mass in grams. A table of recommended values of relative molecular masses is given in ISO 6976.
For an ideal gas, the mole fraction (or percentage) is identical to the volume fraction (percentage), but this relationship cannot in general be assumed to apply to real gas behaviour.