

Natural gas — Determination of composition with defined uncertainty by gas chromatography —

Part 1: Guidelines for tailored analysis

The European Standard EN ISO 6974-1:2001 has the status of a British Standard

ICS 75.060

National foreword

This British Standard is the official English language version of EN ISO 6974-1:2001. It is identical with ISO 6974-1:2000.

The UK participation in its preparation was entrusted to Technical Committee PTI/15, Natural gas and gas analysis, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

This British Standard, having been prepared under the direction of the Sector Committee for Materials and Chemicals, was published under the authority of the Standards Committee and comes into effect on 15 August 2000

Summary of pages

This document comprises a front cover, an inside front cover, the EN ISO title page, the EN ISO foreword page, the ISO title page, pages ii to vi, pages 1 to 17 and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments
13845	10 May 2002	Implementation of the European Standard

© BSI 10 May 2002

ISBN 0 580 36317 1

English version

Natural gas - Determination of composition with defined uncertainty by gas chromatography - Part 1: Guidelines for tailored analysis (ISO 6974-1:2000)

Gaz naturel - Détermination de la composition avec une incertitude définie par chromatographie en phase gazeuse
- Partie 1: Lignes directrices pour l'analyse spéciale (ISO 6974-1:2000)

Erdgas - Bestimmung der Zusammensetzung mit definierter Unsicherheit durch Gaschromatographie - Teil: Richtlinien für die maßgeschneiderte Analyse (ISO 6974-1:2000)

This European Standard was approved by CEN on 22 June 2001.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

CORRECTED 2002-03-13

Foreword

The text of the International Standard from Technical Committee ISO/TC 193 "Natural gas" of the International Organization for Standardization (ISO) has been taken over as a European Standard 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 February 2002, and conflicting national standards shall be withdrawn at the latest by February 2002.

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

**Natural gas — Determination of
composition with defined uncertainty by
gas chromatography —**

**Part 1:
Guidelines for tailored analysis**

*Gaz naturel — Détermination de la composition avec une incertitude
définie par chromatographie en phase gazeuse —*

Partie 1: Lignes directrices pour l'analyse spéciale



Reference number
ISO 6974-1:2000(E)

Contents

Page

Foreword.....	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Symbols and subscripts	4
5 Principles of analysis	4
6 Materials	5
7 Apparatus	5
8 Required characteristics	6
9 Sampling	6
10 Analytical procedure	6
11 Methods of test	8
12 Control chart	10
13 Uncertainty in the mole fraction of the normalized components	10
14 Test report	10
Annex A (informative) Comparative characteristics of typical analytical methods, as described in parts 3 to 6 of ISO 6974	12
Annex B (informative) Use of control charts	13
Bibliography	16

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this part of ISO 6974 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6974-1 was prepared by Technical Committee ISO/TC 193, *Natural gas*, Subcommittee SC 1, *Analysis of natural gas*.

This part as well as the other five parts of ISO 6974 cancel and replace ISO 6974:1984 which specified only one method.

ISO 6974 consists of the following parts, under the general title *Natural gas — Determination of composition with defined uncertainty by gas chromatography*:

- *Part 1: Guidelines for tailored analysis*
- *Part 2: Measuring-system characteristics and statistics for data treatment*
- *Part 3: Determination of hydrogen, helium, oxygen, nitrogen, carbon dioxide and hydrocarbons up to C₈ using two packed columns*
- *Part 4: Determination of nitrogen, carbon dioxide and C₁ to C₅ and C₆₊ hydrocarbons for a laboratory and on-line measuring system using two columns*
- *Part 5: Determination of nitrogen, carbon dioxide and C₁ to C₅ and C₆₊ hydrocarbons for a laboratory and on-line process application using three columns*
- *Part 6: Determination of hydrogen, helium, oxygen, nitrogen, carbon dioxide and hydrocarbons up to C₈ using three capillary columns*

Annexes A and B of this part of ISO 6974 are for information only.

Introduction

This part of ISO 6974 gives guidelines for the "tailored" analysis of natural gas with the aim of determining the mole fractions of the principal components.

ISO 6974 (all parts) describes methods of analysis of natural gas with definable levels of uncertainty. The approach is suitable for the calculation of calorific value and other additive physical properties of the gas, again with a definable uncertainty.

Part 2 of ISO 6974 describes the determination of the measuring system characteristics and the statistical approach to data handling and error calculation with the aim of defining the uncertainties in the component mole fractions.

Part 3 and subsequent parts of ISO 6974 describe different possible methodologies for tailored analyses, which can only be applied in conjunction with parts 1 and 2 of ISO 6974.

Parts 1 and 2 represent the body of ISO 6974. The method chosen from Part 3 and subsequent parts or from any other source requires compliance with parts 1 and 2 of ISO 6974.

Informative annex A gives a comparison of the characteristics of typical analytical methods as described in part 3 and subsequent parts of ISO 6974.

ISO 6974 (all parts) is designed for the measurement of H₂, He, O₂, N₂, CO₂, individual hydrocarbons and/or a total figure for hydrocarbons for example above C₅ defined as C₆₊. It is not applicable to other minor components where their contribution to physical properties is not significant or can be regarded as constant. Among these are potentially natural components such as Ar, H₂O and sulfur compounds, and components arising from gas treatment such as methanol, glycols and amines.

The described method allows air contamination in the sample to be recognized and measured in the case of spot sampling and laboratory analysis, but not necessarily for on-line analysis.

Although "tailored" analysis itself is relatively simple, it can produce an analysis with high accuracy, provided that elaborate preparations are carried out. These include outlining the structure of the analysis, defining the working ranges and establishing the analytical procedure. However, in practice, only a limited number of steps are necessary for setting up the method to meet the requirements for specific application. The amount of work and calculations necessary will then be relatively restricted.

This part of ISO 6974 describes all the essential steps for setting up a "tailored" analysis.

Assuming that the analytical results follow the normal distribution, control charts give an indication as to whether the measuring system and the established method is working satisfactorily. For this reason the use of control charts is described in informative annex B of this part of ISO 6974.

ISO 6974 (all parts) can be used in daily practice in a laboratory and for on-line field applications and covers the following options or alternatives.

- Straight-line or polynomial calibration plots.
- Single-point or multi-level calibration.
- Recombination of components by backflushing to vent, recombination of components by backflushing to measure, or forward elution of all components.
- Calibration one-to-one, or by relative response factors to a reference component.