
**Natural gas — Calculation of
thermodynamic properties —**

Part 1:

**Gas phase properties for transmission
and distribution applications**

Gaz naturel — Calcul des propriétés thermodynamiques —

*Partie 1: Propriétés de la phase gazeuse utilisée pour des applications
de transport et de distribution*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 20765-1 was prepared by Technical Committee ISO/TC 193, *Natural gas*, Subcommittee SC 1, *Analysis of natural gas*.

ISO 20765 consists of the following parts, under the general title *Natural gas — Calculation of thermodynamic properties*:

— *Part 1: Gas phase properties for transmission and distribution applications*

The following parts are under preparation:

— *Part 2: Single phase properties (gas, liquid and dense-fluid) for extended ranges of application*

— *Part 3: Two-phase properties (vapour-liquid equilibria)*

Introduction

This part of ISO 20765 specifies methods for the calculation of thermodynamic properties of natural gases, natural gases containing synthetic admixture, and similar mixtures.

This part of ISO 20765 has four normative annexes and three informative annexes.

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Natural gas — Calculation of thermodynamic properties —

Part 1: Gas phase properties for transmission and distribution applications

1 Scope

This part of ISO 20765 specifies a method of calculation for the volumetric and caloric properties of natural gases, natural gases containing synthetic admixture and similar mixtures, at conditions where the mixture can exist only as a gas.

The method is applicable to pipeline-quality gases within the ranges of pressure, p , and temperature, T , at which transmission and distribution operations normally take place. For volumetric properties (compression factor and density), the uncertainty of calculation is about $\pm 0,1\%$ (95 % confidence interval). For caloric properties (for example enthalpy, heat capacity, Joule-Thomson coefficient, speed of sound), the uncertainty of calculation is usually greater.

2 Normative references

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

ISO 31-3, *Quantities and units — Part 3: Mechanics*

ISO 31-4, *Quantities and units — Part 4: Heat*

ISO 7504, *Gas analysis — Vocabulary*

ISO 12213-2, *Natural gas — Calculation of compression factor — Part 2: Calculation using molar-composition analysis*

ISO 14532, *Natural gas — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 31-4, ISO 7504 and ISO 14532 and the following apply.

NOTE See Annex A for the list of symbols and units used in this part of ISO 20765.

3.1

caloric property

characteristic of a gas or homogeneous gas mixture which can be calculated from a fundamental equation of state

NOTE The caloric properties to which this part of ISO 20765 can be applied are internal energy, enthalpy, entropy, isochoric heat capacity, isobaric heat capacity, Joule-Thomson coefficient, isentropic exponent and speed of sound.