
International Standard



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Natural gas — Determination of potential hydrocarbon liquid content — Part 1: Principles and general requirements

Gaz naturel — Détermination de la teneur en hydrocarbures liquides potentiels — Partie 1: Principes et prescriptions générales

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6570/1 was developed by Technical Committee ISO/TC 158, *Analysis of gases*, and was circulated to the member bodies in May 1982.

It has been approved by the member bodies of the following countries :

Australia	Germany, F.R.	South Africa, Rep. of
Belgium	Ireland	Thailand
Cuba	Italy	United Kingdom
Czechoslovakia	Korea, Rep. of	USSR
France	Mexico	

No member body expressed disapproval of the document.

Natural gas — Determination of potential hydrocarbon liquid content —

Part 1 : Principles and general requirements

0 Introduction

Under certain conditions, higher hydrocarbons present in natural gas or similar gases may condense and the condensate formed can cause difficulties in the operation of gas transport and distribution systems.

Dew point measurements, by condensation on a mirror, may give an indication of the conditions under which condensation starts. However, these measurements give no further information about the amounts of liquid to be expected under operating conditions.

For proper operation of transport and distribution systems, a knowledge of the quantities of condensate formed as a function of temperature and pressure is required. This knowledge is also required for the design of production and treatment systems, and for subsequent handling and disposal of the liquid.

The methods described in this International Standard are intended for the determination of the quantity of hydrocarbon condensate formed from a natural gas or similar gas as function of the temperature and pressure of the gas.

The amount of condensate can be determined in two different ways : by weighing or by volumetric measurement. Both methods of determination give the same result. However, some practical differences are :

- the weighing method can be operated unattended and is therefore suitable for continuous quality control;
- the volumetric method is operated manually. In this method, the hydrocarbon liquid and water separate into two distinct phases. They can be measured separately during the same test provided that the water is present in sufficient quantity, which may be the case for untreated gases.

If using the weighing method, two tests have to be executed in parallel in order to obtain the values for water and hydrocarbon liquid content (see also 6.4).

NOTE — Unless otherwise specified, gas volumes are in cubic metres at 273,15 K and 101 325 Pa.

1 Scope and field of application

This part of ISO 6570 describes the principles of, and general requirements for, methods for the determination of the potential hydrocarbon liquid content of natural gas, or similar gas, at a given pressure and temperature.

The methods themselves are described in more detail in the two other parts of this International Standard: the weighing method being specified in ISO 6570/2 and the volumetric method being specified in ISO 6570/3.

2 References

ISO 6570/2, *Natural gas — Determination of potential hydrocarbon liquid content — Part 2 : Weighing method.*¹⁾

ISO 6570/3, *Natural gas — Determination of potential hydrocarbon liquid content — Part 3 : Volumetric method.*¹⁾

3 Principle

Determination of the quantity of condensate which can be formed at a pressure (p) and a temperature (T) by passing a representative sample of the gas through an apparatus where it is first brought to the pressure (p) and then cooled to the temperature (T).

The temperature and pressure are selected according to the specific application (see clause 5).

Prior to reducing the pressure of the sample of gas to that required for the determination, the gas is heated, so that, after pressure reduction, the temperature is well above the dew point temperature of the gas. Downstream of the reducer, the sample is cooled isobarically in a cooling bath to the required measuring temperature.

The liquids formed are separated from the gas flow and collected, the quantity of liquid being determined by weighing or measurement of volume, and the total volume of gas being measured.

1) At present at the stage of draft.

4 Sampling

In order to obtain reliable results, the conditions described below shall be observed when taking samples.

4.1 General

The gas shall, preferably, be transferred directly to the measuring installation along a pipe from the transmission line or other system. Sample cylinders may, however, be used to transport the gas to the measuring installation. Thus, both direct and indirect sampling methods may be used, but, in each case, it is imperative that the gas reaching the installation is representative of that to be tested.

4.2 Conditions for representative sampling

Sampling in pipeline systems shall preferably be carried out directly after a separator to reduce the chance of any liquid being sampled with the gas.

The sample probe shall penetrate to between one-quarter and three-quarters of the diameter of the main pipeline, so that any liquid on the walls of the main pipeline cannot enter the sample probe.

If hydrocarbon mist is present in the pipeline system, the gas shall be sampled isokinetically. The isokinetic sampling probe (see annex A) in the transmission pipeline shall have a probe inlet of dimensions such that the gas velocities in the pipeline and in the probe inlet do not differ by more than 30 %.

If it is required to measure the quantity of mist separately, direct sampling shall be used (see 6.4).

4.3 Sample line

The whole sampling line shall be heated to at least 5 K above the local dew point in order to avoid condensation. The sample line shall be as short as possible (see figure 1). The sample line shall be temperature controlled at least up to the point where the line enters the measuring space. A suitable method of temperature control is described in annex C.

The gaseous sample shall be passed through a 5 µm sintered metal dust filter (6.5). If mist is present in the gas, the dynamic pressure in the sample line shall be at least 400 Pa.

4.4 Direct sampling

For direct sampling, the sampling line is connected directly to the measuring installation.

4.5 Indirect sampling

It is possible to take a sample in a cylinder and transport it to the laboratory, but the limited volume of the sample then affects the sensitivity and accuracy of the method. In order to ensure that the contents of the cylinder are representative, the cylinder shall be cleaned, dried and checked for hydrocarbon content. Prior to filling, the cylinder shall be evacuated to a pressure below 100 Pa absolute.

Taking samples from a relatively hot system into a cold cylinder causes the gas to contract and may cause condensation. Both factors increase the mass of gas in the cylinder on filling to system pressure compared with the mass of a similar volume of gas under conditions of sampling. Consequently, at the laboratory, before any gas is removed, the cylinder shall be heated for at least 24 h at a temperature at least 10 K above the gas temperature at the sampling point or at the gas/liquid separator upstream of that point, whichever is the higher. Heating is necessary in order to re-evaporate any condensed liquid in the cylinder, and it increases the pressure to above that of the system from which the sample was taken; this excess pressure provides enough gas for measurements to be made at the sampling pressure. The pressure in the cylinder shall be monitored to ensure that the safe working pressure of the cylinder is not exceeded.

5 Conditions of measurement

5.1 Selection of measurement temperature and pressure

The temperature and pressure to which the sample is to be brought in the measuring installation depends on the purpose for which the measurements are made. In general, these conditions are chosen according to the temperature and pressure to which the gas is subjected in the pipeline or processing plant under investigation. Some applications are given below.

5.1.1 Pipelines

In order to determine the possible condensate formation in a pipeline system, the temperature and pressure in the measuring installation have to correspond to those conditions in the pipeline system at which maximum condensate formation occurs.

By measuring at the feeding station of a pipeline grid and at some representative outlet station over a period of time, both at the same reference pressure and temperature, the quantity of condensate formed in that grid can be determined by difference.

5.1.2 Gas delivery contracts

If the method of measurement is used for checking whether a gas is meeting a contract specification with respect to condensate formation at a delivery point, the pressure and temperature in the measuring system shall be those specified by the contract.

5.1.3 Treatment control

Proper functioning of a treatment process may be investigated by carrying out measurements periodically, all being carried out at the same temperature and pressure. In order to obtain an insight into the fluctuations of a process, the measuring temperature chosen should be several kelvins below the lowest dew point expected to be produced by the process.

5.1.4 Designing treatment installations

The quantities of condensate formed in low temperature processing systems can be predicted by simulating the process