

MEMO

HOW TO MEASURE GAS QUALITY

The composition of the natural gas is continuously measured at a number of measurement sites in Nybro, Lille Torup, Stenlille, Egtved and Dragør. The measurement of gas composition is used to analyse and calculate calorific values, Wobbe index and other quality parameters of the natural gas. Calculating the delivered energy to the customers is performed on the basis of all the analyses and calculations. The method of calculation takes into consideration regional differences in gas composition as a result of the actual operating conditions. The information is not to be used to calculate the size of the gas settlement for the particular month in question, but solely to evaluate operating conditions. Calorific value, hydrogen sulphide, overall sulphur content, Wobbe index and methane number are described below:

The calorific value

The overall term describes the amount of heat generated during combustion of the natural gas. The customer pays for the delivered amount of energy, and not for the delivered amount of natural gas. The calorific value is used to calculate how much energy each customer has received.

The Net Calorific Value

A term describing the amount of heat generated, when the temperature of the combustion air and the natural gas prior to combustion is 25°C, when the combustion products (flue gas) are cooled to 25°C, and when the water produced during combustion is present in the form of steam.

The Gross Calorific Value

A term describing the amount of heat developed by combustion of one cubic metre of gas at constant pressure when the gas and air for the combustion have a temperature of 25°C, the combustion products being brought to that temperature and the water formed by the combustion being present in liquid state. The delivered amount of energy is calculated by multiplying the delivered amount of gas by the calorific value.

Wobbe Index

The Wobbe index offers information about the heating effect a burner is exposed

to during combustion of a fuel. The greater the Wobbe index, the greater the heating effect and thereby the greater the load on the burner. The load on a burner is thus directly proportional to the Wobbe index. Different gases with the same Wobbe index will impose the same load on the burner.

The Wobbe index is used also as a safety parameter, in the sense that too high a Wobbe index can result in the production of carbon monoxide and thermal overload. The Wobbe index is regulated according to “The declaration of gas quality - declaration nr. 230 from 21/03/2018 (Bekendtgørelse om gaskvalitet).

Density and Specific Gravity

The specific gravity is the density of natural gas divided by the density of air at the same pressure and temperature and is an expression of the amount of heavier hydrocarbons that are in the natural gas. The relative density is used to control the risk of sooting and is regulated by “The declaration of gas quality - declaration nr. 230 from 21/03/2018 (Bekendtgørelse om gaskvalitet) and Rules for Gas Transport.

Normal density is natural gas density at 1 atm and 0 °C.

Methane Number

The methane number is calculated using an algorithm developed by DGC. A methane number characterises the gas's tendency to resist detonation. It can be compared to the octane number for petrol. A low methane number can lead to detonation and damage to the gas engines if no adjustment is made to the engine's operation.

Hydrogen Sulphide and Overall Sulphur Content

Natural gas from the North Sea contains, among other things, small amounts of hydrogen sulphide (H₂S – “svovlbriente” in Danish). The hydrogen sulphide content is especially important for determining whether the pipeline network will be subject to corrosion. For this reason, the hydrogen sulphide content should be kept as low as possible.

When the gas is being processed in fields in the North Sea, the hydrogen sulphide content is reduced in order that the gas deliveries comply with the requirements set out in the Danish Gas Regulation. The natural gas to the Danish market may contain up to 5 mg/m³n of hydrogen sulphide as a daily average, although a temporary exceedance of the hourly values up to 10 mg/m³n (and a maximum overall sulphur content of 10 mg/m³n in addition to the hydrogen sulphide in the content) is permitted.

When the natural gas is delivered for distribution (to the customers), a sulphurous smelling substance is added - THT (Tetrahydrothiophene). The smelling substance ensures that the otherwise odorless natural gas can be detected in the event of a gas leak. The amount of the smelling substance added is equal to a sulphur content of 4-7 mg/m³n. The overall sulphur content (“totalsvovl” in Danish) of the gas is approx. 6-15 mg/m³n.

Questions Any questions regarding gas quality can be send to gaskvalitet@energinet.dk.