



## Technical note TNE-06

# NORSOK Calibration gases

Acc. to NORSOK I-106 Edition 1, 2014

The NORSOK standards are the result of a cooperation between Statoil, Saga Petroleum and Norsk Hydro that started in 1993. The purpose was to clear the differences in the companies' internal standards and procedures and create a common standard.

Nippon Gases Norge AS has thoroughly reviewed the parts that affect the production of calibration gases. Calculation of produced compositions with associated uncertainties is an important part of this work. A product for calibration of gas chromatographs that is adapted to the NORSOK standard has been developed.

A requirement in NORSOK I-106: 2014 is that each component in the calibration gas shall have documented uncertainty that is equal to or lower than that stated in the NORSOK standard. These uncertainties are stated on the certificate for the specific calibration gas together with the composition of the gas.

Production and validation of the products follow established ISO standards, which is widely accepted in various industry standards.

The specification for the calibration gases included in NORSOK I-106 Edition 1, November 2014 is:

Concentration range (% mol)	Preparation tolerance (% rel.)	Certified uncertainty (% rel.)
1 - 1000 ppm-mol <sup>(1)</sup>	± 5,0	± 5,0
0,1 - 0,25	± 5,0	± 5,0
0,25 - 1	± 3,0	± 1,0
1 - 10	± 3,0	± 0,5
10 - 50	± 3,0	± 0,2
50 - 100	± 2,0	± 0,2

<sup>(1)</sup>As the NORSOK standard I-106 does not specify components with concentrations lower than 1000 ppm, Nippon Gases Norge AS has implemented the standard Nippon Gases Class 1 specification for this level of concentrations, which is highly appreciated by the industry.

**Factors that will influence the uncertainty in the production process:**

### 1. Choice of raw materials

Total purity and specified impurities in raw materials are important in calculation of parameters. If the raw materials contain impurities, it will influence the uncertainty for each and every component.

### 2. Weigh-in

Calibration gases according to the NORSOK standard are produced gravimetrically, meaning all components are weighed according to calculated values. The resolution on balances and scales is of greatest importance as well as the traceability on the weights used to control these.

### 3. Choice of materials and pretreatment of cylinders

To achieve the best quality of calibration gases, it is essential that the surface in contact with the gas is pretreated in a way that no reaction between the components, cylinder and valve will take place. Nippon Gases Norge AS has developed methods for pre-treatment of the inner surface of the cylinders and valves to eliminate this effect.

The gravimetric production method is a completely manual operation and is depending on how the operator complies with established instructions and procedures.