DRAFT TANZANIA STANDARD

Natural gas - Calculation of calorific values, density, relative density and Wobbe Index from composition

TANZANIA BUREAU OF STANDARDS

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National foreword

The Tanzania Bureau of Standards is the statutory National standards body for Tanzania, established under the Act. No.3 of 1975, amended by Act. No.2 of 2009

This Draft Tanzania Standard is being adopted by the Gases Technical Committee under the supervision of the Chemicals Divisional Standards Committee

This draft Tanzania Standard is the identical adoption of ISO 6976:2016 Natural gas - Calculation of calorific values, density, relative density and Wobbe Index from composition The text of the international standard is hereby recommended for approval without deviation for publication as a draft Tanzania standard

Terminologies and conventions

Some terminologies and certain conventions in the ISO standards are not identical with those used in Tanzania Standards and attention is drawn especially to the following:

The comma (,) has been used as a decimal marker (.) for metric dimensions. In Tanzania Standards, it is current practice to use a full point on the base line as the decimal marker.

Wherever the words “International Standard” appear in this Tanzania Standard, they should be interpreted as “Tanzania Standard”.

Scope

This document specifies methods for the calculation of gross calorific value, net calorific value, density, relative density, gross Wobbe index and net Wobbe index of natural gases, natural gas substitutes and other combustible gaseous fuels, when the composition of the gas by mole fraction is known. The methods specified provide the means of calculating the properties of the gas mixture at commonly used reference conditions.
Mole fractions by definition sum to unity. Guidance on the achievement of this requirement by chromatographic analysis is available in ISO 6974-1 and ISO 6974-2.
The methods of calculation require values for various physical properties of the pure components; these values, together with associated uncertainties, are provided in tables and their sources are identified.
Methods are given for estimating the standard uncertainties of calculated properties.
The methods of calculation of the values of properties on either a molar, mass or volume basis are applicable to any natural gas, natural gas substitute or other combustible fuel that is normally gaseous, except that for properties on the volume basis the method is restricted to mixtures for which the compression factor at reference conditions is greater than 0,9.
Example calculations are given in Annex D for the recommended methods of calculation.

NOTE 1 The qualifiers “superior”, “higher”, “upper” and “total” are, for the purposes of this document, synonymous with “gross”; likewise, “inferior” and “lower” are synonymous with “net”. The term “heating value” is synonymous with “calorific value”; “mass density” and “specific density” are synonymous with “density”; “specific gravity” is synonymous with “relative density”; “Wobbe number” is synonymous with “Wobbe index”; “compressibility factor” is synonymous with “compression factor”. The dimensionless quantity molecular weight is numerically equal to the molar mass in $kg \cdot kmol^{-1}$.

NOTE 2 There are no explicit limits of composition to which the methods described in this document are applicable. However, the restriction of volume-basis calculations to mixtures with a compression factor greater than 0,9 at reference conditions sets implicit limits on composition.

NOTE 3 Because the mole fraction of any water present is not normally available from chromatographic analysis, it is common practice to calculate the physical properties on a dry gas basis and to allow for the effects of water vapour in a separate procedure. However, if the mole fraction of water vapour is known then the property calculations can be carried out completely in accordance with the procedures described herein. The effects of water vapour on calorific value, whether the latter is directly measured or calculated, are discussed in ISO/TR 29922.

NOTE 4 For aliphatic hydrocarbons of carbon number 7 or above, any isomer present is included with the normal isomer of the same carbon number.

NOTE 5 If the user's requirement includes the replacement of, for example, a C6+ or C7+ grouping of analytically unresolved components by a single pseudo-component, then it is the user's own task to set the mole fraction composition, and hence properties, of this pseudo-component so as to be fit for purpose in the particular application. Any so-called "spectator water" and "non-combustible hydrogen sulfide" are treated as pseudo-components by setting the appropriate enthalpy of combustion values to zero.