
**Natural gas — Online gas
chromatograph for upstream area**

*Gaz naturels — Chromatographe en phase gazeuse en ligne pour
zone amont*

Sample Document

get full document from standards.iteh.ai



Reference number
ISO/TR 14749:2016(E)

© ISO 2016

Sample Document

get full document from standards.iteh.ai



COPYRIGHT PROTECTED DOCUMENT

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Principle of measurement	1
2.1 General	1
2.2 Gas composition	1
3 Sampling and conditioning	3
4 Online gas chromatograph selection guideline	6
5 Calibration guidelines	7
5.1 Calibration procedure	7
5.1.1 General	7
5.1.2 Calibration	7
5.1.3 Calibration frequency	7
5.2 Calibration gases	8
5.3 Chromatogram verification	8
5.3.1 Response Factor (RF)	8
5.3.2 Retention Time (RT)	8
6 Verification procedure	8
6.1 General	8
6.2 Visual inspection of Sample system	9
6.3 Visual inspection of analyser	9
6.4 Carrier Gas	9
6.5 Calibration Gas	9
6.6 GC verification	9
7 Maintenance and Corrective maintenance	10
7.1 Preventive maintenance	10
7.2 Corrective maintenance	10
8 Alarm and diagnostic	10
9 Repeatability and Reproducibility	12
9.1 Repeatability	12
9.2 Reproducibility	12
10 Data handling during GC failure	12
11 Quality Control of analysis data	13
Annex A (informative) Example, comparison between duty and backup GC	14
Annex B (informative) Example, Typical chromatogram	16
Annex C (informative) Example: Analysis result	18
Bibliography	19

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 193, *Natural gas*, Subcommittee SC 3, *Upstream area*.

get full document from standards.iteh.ai

Introduction

Online Gas Chromatograph (GC) is widely used to determine hydrocarbon components in natural gas because of its “Real time” measurement and ease of use. It has become a powerful tool for both custody transfer and upstream process gas monitoring. Especially for the custody transfer which the calorific value and others gas properties such as, relative density, compressibility factor, etc. are needed for energy determination. Therefore, accuracy and reliability of the equipment are crucial.

With proper maintenance and handling, GC can provide an accurate result with a minimum manpower as it analyzes and provides results continuously. With technology today, the unit can do auto-calibration, alarm setting, diagnostic, troubleshooting and configuring through Human Machine Interface (HMI). Its outputs can be linked directly with Flow computer, Distributed Control System (DCS) or any remote personal computer (PC).

The Natural Gas in upstream petroleum industry is normally wet. Then this Technical Report provides recommended application to handling GC focus on design, selection, operation, maintenance and verification of GC and its peripheral. The purpose is to provide the whole process to proper handling the GC until getting the accurate and reliable results. It is also included the sampling system to get the representative sample, data verification, alarm, diagnostic and troubleshooting including how to deal with the data in case of being used for custody transfer purpose. Some acceptance criteria are also identified in this paper based on our historical record and performance of the equipment.

Sample Document

get full document from standards.iteh.ai

Sample Document

get full document from standards.iteh.ai

Natural gas — Online gas chromatograph for upstream area

1 Scope

This Technical Report concerns the determination of hydrocarbon components up to C7+ in natural gas in upstream petroleum industry, which describes the principle of operation of GC and provides guidelines for selection, evaluation, and factors impacting upon its performance such as sample probe, sample conditioning, installation, operation and troubleshooting.

2 Principle of measurement

2.1 General

The GC is a technique for separating and analysing compounds that can be vaporized without decomposition in a continuous and automatic manner of sample injection, separation, data integration and reporting. A precise volume of sample gas is injected into the column which contains a stationary phase (packing) that is either an active solid (adsorption partition) or an inert solid support that is coated with a liquid phase (absorption partitioning). The gas is moved through the column by means of a mobile phase (carrier gas). Selective retention of the components of the sample takes place in the column and causes each component to move through the column at a different rate. This action separates the sample into its gaseous constituents.

A detector detects the elution of component from the column and produces electrical outputs proportional to the concentration of each component. Output from the detector are amplified in the electronics, then transmitted to the controller for further processing.

2.2 Gas composition

Natural gas is composed primarily of methane with smaller amounts of higher hydrocarbons and of non combustible gases. Major, minor and trace components are as indicated in [Tables 1, 2](#) and [3](#):

Table 1 — Major components

Component	Units
Methane	mole %
Ethane	mole %
Propane	mole %
Butanes	mole %
Pentanes	mole %
Hexanes	mole %
Heptanes plus	mole %
Nitrogen	mole %
Carbon dioxide	mole %