ISO 10715:2022-10 (E)

Natural gas - Gas sampling

Contents

Page

Foreword vi

Introduction vii

1 Scope 1

2 Normative references 1

3 Termsanddefinitions 1

4 Safety considerations 4

5 Principles of sampling 4

6 The concept of representative sample 4

7 Types of sampling 5
7.1 Sampling method considerations 5
7.2 Spot sampling 6
7.2.1 General 6
7.2.2 Fill-and-empty method 6
7.2.3 Controlled-rate method 7
7.2.4 Evacuated-cylinder method 7
7.2.5 Helium pre-fill method 7
7.2.6 Floating-piston cylinder method 7
7.2.7 Single cavity sample cylinder 7
7.2.8 Sampling frequency 7
7.3 Incremental sampling (continuous or composite) 9
7.3.1 General considerations 9
7.3.2 Intervals 9
7.3.3 System considerations 9
7.3.4 Monitoring the filling process 10
7.3.5 Cylinder tracking 10
7.3.6 Overpressure protection 10
7.4 Online or direct sampling 10
7.4.1 General considerations 10
7.4.2 Automatic drainage 12
7.4.3 Reducing the pressure 12
7.4.4 Inert-gas purging 13
7.4.5 Safety/pressure relief valve 13
7.4.6 Heating of sample line 13

8 Sampling location 13
8.1 General 13
8.2 Sampling place 13
8.2.1 General 13
8.2.2 Relevant gas 14
8.2.3 Undisturbed gas 14
8.2.4 Access 14
8.3 Sampling position 15
8.4 Sampling point 15

9 Ideal implementation of gas sampling 16
9.1 General 16
9.2 Gas sorption 16
9.2.1 General 16
9.2.2 Surface treatment 17
9.2.3 Sorption considerations regarding sampling equipment 17
9.2.4 Equilibrating of sampling equipment 17
9.3 Materials used in sampling 18
9.3.1 General considerations 18
9.3.2 Steel grades 19
9.3.3 Epoxy coatings 19
9.3.4 Other polymers 19
9.3.5 Rubbers 19
9.3.6 Bimetallic corrosion 19
9.4 Sample contamination 19
9.4.1 Cleanliness 19
9.4.2 Cleaning sampling systems 19
9.4.3 Pre-charging of sample cylinders 20
9.5 Sample condensation 20
9.5.1 Temperature 20
9.5.2 Pressure reduction and Joule Thomson cooling 20
9.5.3 Condensation and revaporization 22
9.6 Disturbance of the flow through the sampling system 24
9.7 Delay time 24
9.7.1 Direct sampling method 24
9.7.2 Indirect sampling method 25

10 Sampling equipment 26
10.1 General 26
10.2 Probes 27
10.2.1 General 27
10.2.2 Straight-tube probe 27
10.2.3 Probe regulator 28
10.2.4 Pitot probe 29
10.3 Tubings 30
10.3.1 Sampling and sample lines 30
10.3.2 Bypass constructions 31
10.4 Filters, membranes and separators 31
10.5 Valves and safety valves 32
10.6 Fittings 33
10.7 Flow monitoring and control 33
10.8 Pressure reducers 33
10.9 Pressure sensor/manometers 33
10.10 Heating devices 33
10.11 Seals and lubricants 34
10.12 Sample containers or cylinders 34
10.12.1 General 34
10.12.2 Standard or single cavity cylinder 35
10.12.3 Floating-piston cylinders or Constant Pressure cylinders 35
10.13 Concentration devices 36
10.14 Number and sequence of equipment 37

11 Verificationofthesystem 38

12 Troubleshooting 39

Annex A (informative) Purposes of sampling, panel of compounds and information in the sampling report 41

Annex B (informative) Procedures for sampling 42

Annex C (informative) Gas sorption effect: adsorption/desorption 49

Annex D (informative) Cleaning of steel sampling cylinders 50

Annex E (informative) Joule-Thomson cooling and phase behaviour 51

Annex F (informative) Vortex shedding and associated problems 54

Annex G (informative) Guidelines for the calculation of the residence time 58

Annex H (informative)Protocolforgassamplingsystemverification 66

Annex I (informative) Number of samples 68

Bibliography 70