# DIN EN ISO 10715:2023-03 (E)

## Natural gas - Gas sampling (ISO 10715:2022)

## Contents

Page


**European foreword** ... **5**

**Foreword** ... **6**

**Introduction** ... **7**

**1 Scope** ... **8**

**2 Normative references** ... **8**

**3 Terms and definitions** ... **8**

**4 Safety considerations** ... **11**

**5 Principles of sampling** ... **11**

**6 The concept of representative sample** ... **11**

**7 Types of sampling** ... **12**
7.1 Sampling method considerations ... 12
7.2 Spot sampling ... 13
7.2.1 General ... 13
7.2.2 Fill-and-empty method ... 13
7.2.3 Controlled-rate method ... 14
7.2.4 Evacuated-cylinder method ... 14
7.2.5 Helium pre-fill method ... 14
7.2.6 Floating-piston cylinder method ... 14
7.2.7 Single cavity sample cylinder ... 14
7.2.8 Sampling frequency ... 14
7.3 Incremental sampling (continuous or composite) ... 16
7.3.1 General considerations ... 16
7.3.2 Intervals ... 16
7.3.3 System considerations ... 16
7.3.4 Monitoring the filling process ... 17
7.3.5 Cylinder tracking ... 17
7.3.6 Overpressure protection ... 17
7.4 Online or direct sampling ... 17
7.4.1 General considerations ... 17
7.4.2 Automatic drainage ... 19
7.4.3 Reducing the pressure ... 19
7.4.4 Inert-gas purging ... 20
7.4.5 Safety/pressure relief valve ... 20
7.4.6 Heating of sample line ... 20

**8 Sampling location** ... **20**
8.1 General ... 20
8.2 Sampling place ... 20
8.2.1 General ... 20
8.2.2 Relevant gas ... 21
8.2.3 Undisturbed gas ... 21
8.2.4 Access ... 21
8.3 Sampling position ... 22
8.4 Sampling point ... 22

**9 Ideal implementation of gas sampling** ... **23**
9.1 General ... 23
9.2 Gas sorption ... 23

9.2.1 General 23
9.2.2 Surface treatment 24
9.2.3 Sorption considerations regarding sampling equipment 24
9.2.4 Equilibrating of sampling equipment 24
9.3 Materials used in sampling 25
9.3.1 General considerations 25
9.3.2 Steel grades 26
9.3.3 Epoxy coatings 26
9.3.4 Other polymers 26
9.3.5 Rubbers 26
9.3.6 Bimetallic corrosion 26
9.4 Sample contamination 26
9.4.1 Cleanliness 26
9.4.2 Cleaning sampling systems 26
9.4.3 Pre-charging of sample cylinders 27
9.5 Sample condensation 27
9.5.1 Temperature 27
9.5.2 Pressure reduction and Joule Thomson cooling 27
9.5.3 Condensation and revaporization 29
9.6 Disturbance of the flow through the sampling system 31
9.7 Delay time 31
9.7.1 Direct sampling method 31
9.7.2 Indirect sampling method 32

**10 Sampling equipment 33**
10.1 General 33
10.2 Probes 34
10.2.1 General 34
10.2.2 Straight-tube probe 34
10.2.3 Probe regulator 35
10.2.4 Pitot probe 36
10.3 Tubings 37
10.3.1 Sampling and sample lines 37
10.3.2 Bypass constructions 38
10.4 Filters, membranes and separators 38
10.5 Valves and safety valves 39
10.6 Fittings 40
10.7 Flow monitoring and control 40
10.8 Pressure reducers 40
10.9 Pressure sensor/manometers 40
10.10 Heating devices 40
10.11 Seals and lubricants 41
10.12 Sample containers or cylinders 41
10.12.1 General 41
10.12.2 Standard or single cavity cylinder 42
10.12.3 Floating-piston cylinders or Constant Pressure cylinders 42
10.13 Concentration devices 43
10.14 Number and sequence of equipment 44

**11 Verification of the system 45**

**12 Troubleshooting 46**

**Annex A** (informative) **Purposes of sampling, panel of compounds and information in the sampling report 48**

**Annex B** (informative) **Procedures for sampling 49**

**Annex C** (informative) **Gas sorption effect: adsorption/desorption 56**

**Annex D** (informative) **Cleaning of steel sampling cylinders 57**

**Annex E** (informative) **Joule-Thomson cooling and phase behaviour 58**

**Annex F** (informative) **Vortex shedding and associated problems 61**

**Annex G** (informative) **Guidelines for the calculation of the residence time 65**

**Annex H** (informative) **Protocol for gas sampling system verification 73**

**Annex I** (informative) **Number of samples 75**

**Bibliography 77**