DIN EN ISO 8222:2020-10 (E)

Petroleum measurement systems - Calibration - Volumetric measures, proving tanks and field measures (including formulae for properties of liquids and materials) (ISO 8222:2020)

Contents

Page

European foreword ... **4**

Foreword ... **5**

Introduction ... **6**

1 Scope ... **7**

2 Normative references ... **7**

3 Terms, definitions, symbols and units ... **7**
3.1 Terms and definitions ... 7
3.2 Symbols and units ... 14

4 Traceability ... **15**

5 General design characteristics of volumetric measures ... **16**
5.1 General design ... 16
5.2 Design to indicate the volume — Resolution ... 18
5.2.1 Neck size ... 18
5.2.2 Gauge glass ... 18
5.2.3 Scales ... 19
5.2.4 Adjustment of scale and calibrated volume ... 21
5.2.5 Levelling ... 21
5.3 Additional design aspects ... 21
5.3.1 Temperature measurement ... 21
5.3.2 Valves and connections ... 22
5.3.3 Size of measures ... 23
5.4 Filling and drainage ... 24
5.4.1 Drainage times and fluids ... 24
5.4.2 Filling and drainage methods ... 25
5.5 Markings ... 26

6 Test measures ... **27**
6.1 Overview ... 27
6.2 Design and construction of test measures ... 29

7 Proving tanks ... **30**
7.1 Overview ... 30
7.2 General construction ... 34
7.3 Bottom neck ... 34
7.4 Strength ... 35
7.5 Support ... 35
7.6 Size ... 35
7.7 Mobility ... 35
7.8 Overflow and vapour recovery ... 35
7.9 Filling and drainage ... 35

8 Alternative designs ... **36**
8.1 High-accuracy designs ... 36
8.2 Automatic pipettes ... 36
8.3 Proving tanks with bottom sight gauge ... 36

9 Calibration **37**
9.1 General 37
9.2 Common calibration procedures 37
9.3 Gravimetric calibration 39
9.3.1 Principle 39
9.3.2 Calibration circuit and equipment 39
9.3.3 Procedure for calibrating a measure gravimetrically 40
9.4 Volumetric calibration 40
9.4.1 Principle 40
9.4.2 Calibration circuit and equipment 41
9.4.3 Procedure for calibrating a measure volumetrically (water pour) 42
9.4.4 Procedure for calibrating a measure volumetrically (water withdraw) 42
9.4.5 Additional notes on procedures 43
9.5 Calibration by reference meter 44
9.5.1 Principle 44
9.5.2 Calibration circuit 44
9.5.3 Equipment 45
9.5.4 Procedure for calibration by reference meter 46
9.6 Calibration of neck scales 46

10 Calculations **47**
10.1 Overview 47
10.2 Reference volume 47
10.3 Transferred volume (volumetric method) 48
10.4 Transferred volume (gravimetric method) 49
10.5 Calibrated volume of test device 50
10.6 Multiple fills 51
10.7 Calibration of a measure using a reference measure 51
10.8 Calibration of a flowmeter using a measure as reference 52
10.9 Calibration of a displacement (pipe) prover using a measure as reference 52

11 Calibrating and setting the neck and scale **52**
11.1 Calibrating the neck 52
11.2 Setting the scales 53

12 Safety **54**

Annex A (informative) **Properties of fluids and materials** **55**

Annex B (informative) **Temperature measurement and thermometers** **69**

Annex C (informative) **Standard glass contents measures** **71**

Annex D (informative) **Meniscus reading** **72**

Annex E (informative) **Accuracy and uncertainty of volumetric measures** **73**

Bibliography **74**