

DIN EN ISO 8222:2022-04 (E)

Petroleum measurement systems - Calibration - Volumetric measures, proving tanks and field measures (including formulae for properties of liquids and materials) (ISO 8222:2020 + Amd 1:2022) (includes Amendment :2022)

| Contents | Page |
|---|-------------|
| European foreword..... | 4 |
| [A₁] European foreword to Amendment [A₁] | 5 |
| Foreword..... | 6 |
| Introduction..... | 7 |
| 1 Scope | 8 |
| 2 Normative references | 8 |
| 3 Terms, definitions, symbols and units | 8 |
| 3.1 Terms and definitions..... | 8 |
| 3.2 Symbols and units..... | 15 |
| 4 Traceability | 16 |
| 5 General design characteristics of volumetric measures | 17 |
| 5.1 General design..... | 17 |
| 5.2 Design to indicate the volume — Resolution..... | 19 |
| 5.2.1 Neck size..... | 19 |
| 5.2.2 Gauge glass..... | 19 |
| 5.2.3 Scales..... | 20 |
| 5.2.4 Adjustment of scale and calibrated volume..... | 22 |
| 5.2.5 Levelling..... | 22 |
| 5.3 Additional design aspects..... | 22 |
| 5.3.1 Temperature measurement..... | 22 |
| 5.3.2 Valves and connections..... | 23 |
| 5.3.3 Size of measures..... | 24 |
| 5.4 Filling and drainage..... | 25 |
| 5.4.1 Drainage times and fluids..... | 25 |
| 5.4.2 Filling and drainage methods..... | 26 |
| 5.5 Markings..... | 27 |
| 6 Test measures | 28 |
| 6.1 Overview..... | 28 |
| 6.2 Design and construction of test measures..... | 30 |
| 7 Proving tanks | 31 |
| 7.1 Overview..... | 31 |
| 7.2 General construction..... | 35 |
| 7.3 Bottom neck..... | 35 |
| 7.4 Strength..... | 36 |
| 7.5 Support..... | 36 |
| 7.6 Size..... | 36 |
| 7.7 Mobility..... | 36 |
| 7.8 Overflow and vapour recovery..... | 36 |
| 7.9 Filling and drainage..... | 36 |
| 8 Alternative designs | 37 |
| 8.1 High-accuracy designs..... | 37 |
| 8.2 Automatic pipettes..... | 37 |
| 8.3 Proving tanks with bottom sight gauge..... | 37 |

| | | |
|--|--|-----------|
| 9 | Calibration | 38 |
| 9.1 | General..... | 38 |
| 9.2 | Common calibration procedures..... | 38 |
| 9.3 | Gravimetric calibration..... | 40 |
| 9.3.1 | Principle..... | 40 |
| 9.3.2 | Calibration circuit and equipment..... | 40 |
| 9.3.3 | Procedure for calibrating a measure gravimetrically | 41 |
| 9.4 | Volumetric calibration..... | 41 |
| 9.4.1 | Principle..... | 41 |
| 9.4.2 | Calibration circuit and equipment..... | 42 |
| 9.4.3 | Procedure for calibrating a measure volumetrically (water pour)..... | 43 |
| 9.4.4 | Procedure for calibrating a measure volumetrically (water withdraw)..... | 43 |
| 9.4.5 | Additional notes on procedures | 44 |
| 9.5 | Calibration by reference meter..... | 45 |
| 9.5.1 | Principle..... | 45 |
| 9.5.2 | Calibration circuit..... | 45 |
| 9.5.3 | Equipment..... | 46 |
| 9.5.4 | Procedure for calibration by reference meter | 47 |
| 9.6 | Calibration of neck scales | 47 |
| 10 | Calculations | 48 |
| 10.1 | Overview | 48 |
| 10.2 | Reference volume | 48 |
| 10.3 | Transferred volume (volumetric method)..... | 49 |
| 10.4 | Transferred volume (gravimetric method)..... | 50 |
| 10.5 | Calibrated volume of test device..... | 51 |
| 10.6 | Multiple fills..... | 52 |
| 10.7 | Calibration of a measure using a reference measure..... | 52 |
| 10.8 | Calibration of a flowmeter using a measure as reference..... | 53 |
| 10.9 | Calibration of a displacement (pipe) prover using a measure as reference | 53 |
| 11 | Calibrating and setting the neck and scale | 53 |
| 11.1 | Calibrating the neck..... | 53 |
| 11.2 | Setting the scales..... | 54 |
| 12 | Safety | 55 |
| Annex A (informative) Properties of fluids and materials | | 56 |
| Annex B (informative) Temperature measurement and thermometers | | 69 |
| Annex C (informative) Standard glass contents measures | | 70 |
| Annex D (informative) Meniscus reading | | 71 |
| Annex E (informative) Accuracy and uncertainty of volumetric measures | | 72 |
| Bibliography | | 73 |