

DIN CEN ISO/TS 24672:2024-11 (E)

Nanotechnologies - Guidance on the measurement of nanoparticle number concentration (ISO/TS 24672:2023); English version CEN ISO/TS 24672:2024

| Contents | | Page |
|-------------------|---|-------------|
| Foreword..... | | v |
| Introduction..... | | vi |
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Terms and definitions | 1 |
| 4 | Abbreviated terms | 4 |
| 5 | Overview | 5 |
| 5.1 | General..... | 5 |
| 5.2 | Comparison of different techniques..... | 5 |
| 5.3 | Considerations when selecting a technique..... | 8 |
| 5.3.1 | General..... | 8 |
| 5.3.2 | Type of particles..... | 8 |
| 5.3.3 | Number concentration range..... | 9 |
| 5.3.4 | Accuracy and precision..... | 9 |
| 5.3.5 | Other factors..... | 10 |
| 5.4 | Unit for nanoparticle number concentration..... | 10 |
| 6 | Ensemble techniques | 11 |
| 6.1 | Differential centrifugal sedimentation..... | 11 |
| 6.1.1 | General..... | 11 |
| 6.1.2 | Sample specifications..... | 12 |
| 6.1.3 | Technical aspects..... | 12 |
| 6.1.4 | Sources of uncertainty and challenges..... | 14 |
| 6.1.5 | Outlook..... | 15 |
| 6.2 | Multi-angle dynamic light scattering..... | 15 |
| 6.2.1 | General..... | 15 |
| 6.2.2 | Sample specifications..... | 15 |
| 6.2.3 | Technical aspects..... | 16 |
| 6.2.4 | Sources of uncertainty and challenges..... | 17 |
| 6.2.5 | Outlook..... | 17 |
| 6.3 | Small-angle X-ray scattering..... | 17 |
| 6.3.1 | General..... | 17 |
| 6.3.2 | Sample specifications..... | 18 |
| 6.3.3 | Technical aspects..... | 18 |
| 6.3.4 | Sources of uncertainty and challenges..... | 20 |
| 6.3.5 | Outlook..... | 20 |
| 6.4 | Ultraviolet-visible spectroscopy..... | 20 |
| 6.4.1 | General..... | 20 |
| 6.4.2 | Sample specifications..... | 21 |
| 6.4.3 | Technical aspects..... | 21 |
| 6.4.4 | Sources of uncertainty and challenges..... | 22 |
| 6.4.5 | Outlook..... | 23 |
| 7 | Particle counting techniques | 23 |
| 7.1 | Particle tracking analysis..... | 23 |
| 7.1.1 | General..... | 23 |
| 7.1.2 | Sample specifications..... | 23 |
| 7.1.3 | Technical aspects..... | 24 |

| | | |
|---|---|-----------|
| 7.1.4 | Sources of uncertainty and challenges..... | 24 |
| 7.1.5 | Outlook..... | 25 |
| 7.2 | Resistive pulse sensing..... | 25 |
| 7.2.1 | General..... | 25 |
| 7.2.2 | Sample specifications..... | 26 |
| 7.2.3 | Technical aspects..... | 27 |
| 7.2.4 | Sources of uncertainty and challenges..... | 28 |
| 7.2.5 | Outlook..... | 28 |
| 7.3 | Single particle inductively coupled plasma mass spectrometry..... | 28 |
| 7.3.1 | General..... | 28 |
| 7.3.2 | Sample specifications..... | 29 |
| 7.3.3 | Technical aspects..... | 29 |
| 7.3.4 | Sources of uncertainty and challenges..... | 33 |
| 7.3.5 | Outlook..... | 33 |
| 7.4 | Condensation particle counter and differential mobility analysing system..... | 34 |
| 7.4.1 | General..... | 34 |
| 7.4.2 | Sample specifications..... | 34 |
| 7.4.3 | Technical aspects..... | 35 |
| 7.4.4 | Sources of uncertainty and challenges..... | 37 |
| 7.4.5 | Outlook..... | 38 |
| Annex A (informative) Summary of VAMAS international interlaboratory studies | | 40 |
| Annex B (informative) General guidance on sample preparation for suspensions containing nanoparticles..... | | 43 |
| Bibliography..... | | 46 |