# TECHNICAL SPECIFICATION
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English Version

## Nanotechnologies - Magnetic nanomaterials - Part 1: Specification of characteristics and measurements for magnetic nanosuspensions (ISO/TS 19807-1:2019)

Nanotechnologies - Nanomatériaux magnétiques - Partie 1: Spécification des caractéristiques et des mesures pour les nanosuspensions magnétiques (ISO/TS 19807-1:2019)

Nanotechnologien - Magnetische Nanopartikel - Teil 1: Festlegung der Eigenschaften und Messung magnetischer Nanosuspensionen (ISO/TS 19807-1:2019)

This Technical Specification (CEN/TS) was approved by CEN on 20 March 2022 for provisional application.

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# European foreword

The text of ISO/TS 19807-1:2019 has been prepared by Technical Committee ISO/TC 229 "Nanotechnologies" of the International Organization for Standardization (ISO) and has been taken over as CEN ISO/TS 19807-1:2022 by Technical Committee CEN/TC 352 "Nanotechnologies" the secretariat of which is held by AFNOR.

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## Endorsement notice

The text of ISO/TS 19807-1:2019 has been approved by CEN as CEN ISO/TS 19807-1:2022 without any modification.

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# Foreword

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# Introduction

Nanomaterials offer the opportunity for new technologies at the interfaces between chemistry, physics and biology. The term nanomaterial is used to refer to a wide range of particles, thin films, self-assembling and lithographically produced structures in which at least one dimension is less than 100 nm. Magentic nanosuspensions are fluid nanodispersion, where the solid phase is formed by magnetic nanoparticles.Magnetic nanosuspensions and bulk materials react to applied magnetic fields in different ways. These unique properties enable the development of innovative technologies and products.

Magnetic nanosuspensions have important potential industrial and healthcare applications such as vacuum seals, lubricants, coolants, dampers, magnetic soaps, environmental remediation, medical imaging, drug delivery technologies, magnetic hyperthermia therapy, etc. To satisfy the demands of rapidly accelerating application markets, there is a strong need to provide universal definitions and measurement methods for the characteristics of these suspensions. There are three components of a magnetic nanosuspension: (1) magnetic nanoparticles (2) dispersing medium and (3) dispersant (Annex A).

# Nanotechnologies — Magnetic nanomaterials —

## Part 1: Specification of characteristics and measurements for magnetic nanosuspensions



## 1 Scope

This document specifies the characteristics of magnetic nanosuspensions to be measured and lists measurement methods for measuring these characteristics.

This is a generic document and does not deal with any particular application.

## 2 Normative references

There are no normative references for this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

**3.1**
**AC susceptibility**
complex ratio between the dynamic magnetization and the applied magnetic excitation field

Note 1 to entry: The dynamic magnetization is given as $M = M_0 e^{(i2\pi ft - \phi)}$ and the applied magnetic excitation field is given as $H = H_0 e^{i2\pi ft}$. The AC susceptibility $\chi = M / H$ is divided into an in-phase component (real part) and an out-of-phase component (imaginary part): $\chi = \chi' - i\chi''$.

Note 2 to entry: In dependence on the type of magnetization that is used, the AC susceptibility of a material is related to volume, mass or amount of the material.

AC volume susceptibility $$\chi_V = \frac{M_{0V}}{H_0}\cos\varphi - i\frac{M_{0V}}{H_0}\sin\varphi$$

AC mass susceptibility $$\chi_m = \frac{M_{0m}}{H_0}\cos\varphi - i\frac{M_{0m}}{H_0}\sin\varphi$$

AC molar susceptibility $$\chi_n = \frac{M_{0n}}{H_0}\cos\varphi - i\frac{M_{0n}}{H_0}\sin\varphi$$

Note 3 to entry: AC susceptibility depends on the excitation field frequency and the temperature, which should also be indicated.