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## Magnetizing method of permanent magnet

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# Foreword

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# Magnetizing method of permanent magnet

## 1 Scope

This document provides the magnetization principles of permanent magnets, specifies the requirements for magnetization devices, test specimens and magnetization procedures, describes the test methods for different types of magnetization effects, and specifies the requirements for product magnetization reports.

This document applies to the technical magnetization of permanent magnets processed from permanent magnet materials including rare earth iron boron, rare earth cobalt, alnico, samarium-iron-nitrogen, and permanent ferrite magnets.

## 2 Normative References

The contents of the following documents are incorporated as essential provisions of this document through normative reference in the text. For dated referenced documents, only the edition corresponding to the date applies to this document; for undated referenced documents, the latest edition (including all amendments) applies to this document.

GB/T 2900.60-2002 Electrotechnical terminology—Electromagnetism

GB/T 2900.83-2008 Electrotechnical terminology—Electrical and magnetic devices

GB/T 3217-2013 Permanent magnet (hard magnetic) materials—Methods of magnetic property tests

GB/T 9637-2001 Electrotechnical terminology—Magnetic materials and components

GB/T 38437-2019 Methods for measuring the magnetic dipole moment of ferromagnetic material samples by pulling or rotating

GB/T 43264-2023 Test method for surface magnetic field distribution of permanent magnets

GB/T 43266-2023 Measurement method for magnetic declination of permanent magnets

## 3 Terms and Definitions

The terms and definitions specified in GB/T 2900.60-2002, GB/T 2900.83-2008, GB/T 9637-2001 and GB/T 3217-2013, as well as the following terms and definitions, apply to this document.

### 3.1 Single-Pole Magnetization

A magnetization method that generates a single pair of magnetic poles on the same magnet.

### 3.2 Multipole Magnetization

A magnetization method that generates two or more pairs of magnetic poles on the same magnet.

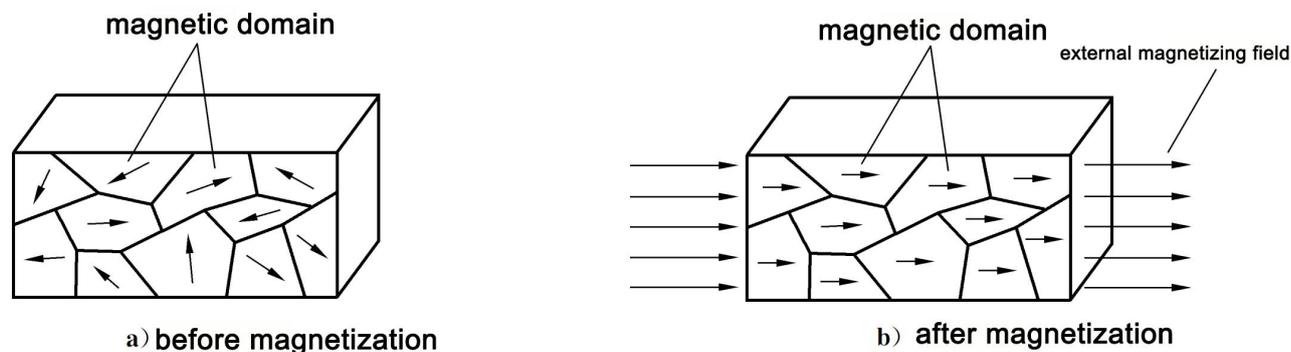
### 3.3 Magnetization Operating Parameters

The equipment operating parameters set when magnetizing the sample to be magnetized.

## 4 Magnetization Principle

Under the action of an external magnetic field, magnetic materials achieve macroscopic magnetization through internal magnetic domain rotation and domain wall displacement, as illustrated in Figure 1.

Figure 1 Schematic Diagram of Magnetization Principle



See Annex A for the magnetization process of permanent magnets.

## 5 Magnetization Methods

### 5.1 Classification

According to different magnetization orientations, it can be divided into four types, namely monopole magnetization, multipole magnetization, radial magnetization, and Halbach array magnetization.

### 5.2 Monopole Magnetization

The monopole magnetization method mainly includes axial magnetization and radial magnetization. After magnetization, the product exhibits a pair of N and S magnetic poles, as shown in Figure 2.

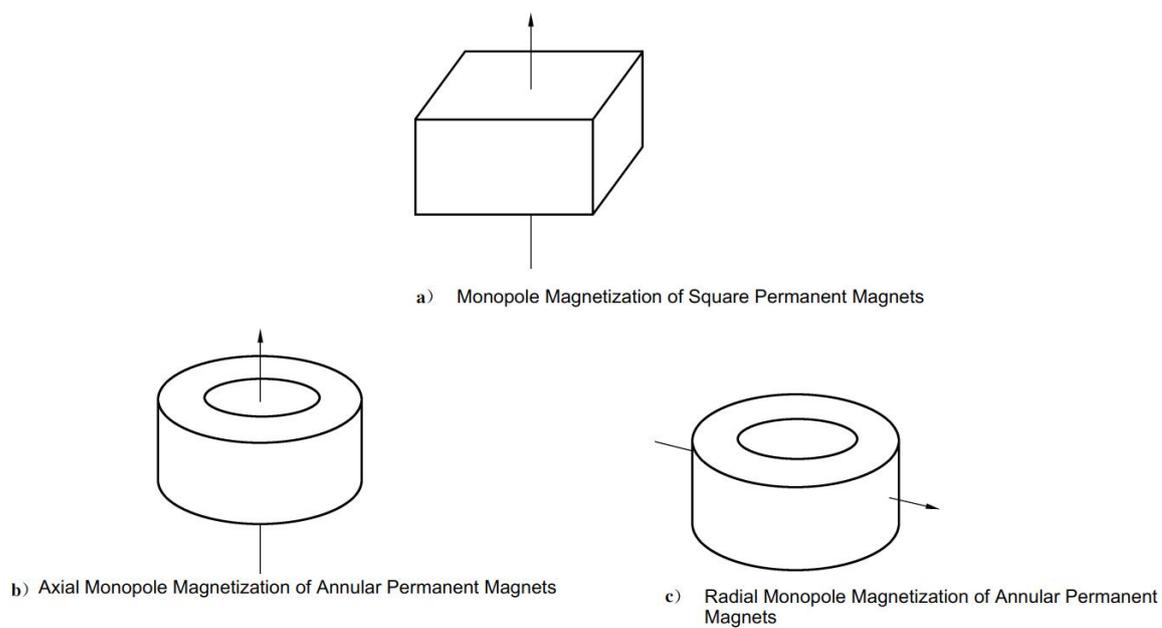


Figure 2 Example of Monopole Magnetization

### 5.3 Multipole Magnetization

Multipole magnetization employs customized magnetizing coils for magnetizing. After magnetization, two or more pairs of N and S magnetic poles are exhibited on the same magnet, as shown in Figure 3.