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**NATIONAL STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA**

**GB/T 21448-2017**

Replacing GB/T 21448-2008

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**Specification of cathodic protection for underground steel  
pipelines**

埋地钢质管道阴极保护技术规范

**(English Translation)**

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### Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard replaces GB/T 21448-2008 "Technical Specifications for Cathodic Protection of Buried Steel Pipelines", compared with GB/T 21448-2008, the main technical changes except editorial changes are as follows.

- further clarified the requirements for temporary cathodic protection (see 4.1.3);
- Modified the "Cathode Protection Guidelines" and added "Cathode Protection Guidelines under AC Interference" and "Cathode Protection Guidelines under DC Interference" the provisions of "" (see 4.4);
- Increased requirements for forced current system power supply equipment (see 5.1);
- Increased the main performance requirements of graphite anodes, conductive polymer linear anodes and MMO-Ti linear anodes (see 5.2.5.2, 5.2.5.3 and 5.2.5.4);
- Added "Cathodic Protection for Parallel Pipes" requirements (see 5.3);
- Modified sacrificial anode performance specifications (see 6.2 and 6.3); increased design requirements for sacrificial anode systems (see 6.4.1);

Changed the selection requirements of the sacrificial anode type and the requirements for

filling materials (see 6.4.2 and 6.5);

--- Refined the special requirements of the test device (see 7.1.2), increased the type of test piles (see 7.1.3), added "check films, Polarized probe and resistance probe" (see 7.1.4);

--- Refined the requirements related to casing, lightning protection and surge protectors in "Additional Measures" (see 8.2, 8.3 and 8.4);

--- Added "construction and commissioning" (see Chapter 9);

--- Modified the contents of "Management and Maintenance" (see Chapter 10);

--- Revised Appendix A and removed Appendix B. Appendix A was revised from a normative appendix to an informative appendix (see Appendix A).

This standard uses the redrafting method to refer to ISO 15589-1:2015 "Cathodic protection of pipeline systems for petroleum, petrochemical and natural gas industries" Part 1. The Onshore Pipeline is compiled, and the degree of conformity with ISO 15589-1:2015 is non-equivalent.

This standard is proposed and managed by the National Oil and Gas Standardization Technical Committee (SAC/TC355).

This standard was drafted. China Petroleum Pipeline Engineering Co., Ltd., China Petroleum Planning Institute, China National Petroleum Pipeline Branch, Southwest Branch of China National Petroleum Corporation Engineering Design Co., Ltd., Sinopec Pipeline Storage and Transportation Co., Ltd.

## 1 Scope

This standard specifies the design, construction, testing, management and maintenance of the external surface cathodic protection system for land-buried steel pipelines (hereinafter referred to as pipelines).

Minimum technical requirements for protection.

This standard applies to land-buried steel oil, gas, water pipelines.

## 2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 4208 enclosure protection grade GB/T 4950 zinc-aluminum-cadmium alloy sacrificial anode GB/T 10123 Metal and alloy corrosion basic terms and definitions GB/T 17731

magnesium alloy sacrificial anode GB/T 21246 buried steel pipeline cathodic protection parameter measurement method GB 50058 Explosion Hazardous Environment Power Equipment Design Specification GB 50217 Power Engineering Cable Design Specification GB/T 50698 buried steel pipeline AC interference protection technical standards GB 50991 buried metal pipeline DC interference protection technical standards SY/T 0029 Buried steel inspection sheet application technical specification SY/T 0086 Cathodic Protection Pipe Electrical Insulation Standard SY/T 0087.1 Corrosion Evaluation Criteria for Steel Pipelines and Storage Tanks Direct Evaluation of External Corrosion of Buried Steel Pipelines SY/T 0096 forced current deep anode bed technical specification SY/T 0516 Technical Specifications for Insulated Joints and Insulated Flanges SY/T 6964 Technical Specification for Cathodic Protection of Oil and Gas Stations

### 3.1 Terms and definitions

The following terms and definitions as defined in GB/T 10123 apply to this document.

#### 3.1.1

**Anode filler anodebackfil** A low-resistivity material filled around the buried anode to maintain humidity, reduce electrical resistance between the anode and the electrolyte, and prevent yang Extremely polarized.

#### 3.1.2

**Jumper bond**

Use metal conductors (mostly copper conductors) to connect two points on the same metal structure or different metal structures to ensure the between two points Electrical continuity.

#### 3.1.3

**Decoupling direct device directcurrentdecouplingdevice** A device that provides low impedance for AC current and high resistance channels for DC current.

For example. polarized batteries, capacitors, diodes.

#### 3.1.4

**Confluence point drainpoint** the connection point between the cathode cable and the protected pipe in the cathodic protection system, through which the protection current flows back to the power source.

#### 3.1.5

**Equipotential bonding equipotential bonding** the separate metal structure is directly connected to the lightning protection device by a conductor or via a surge protector to reduce the potential difference caused by the lightning current.

#### 3.1.6

## Ground bed

Buried sacrificial anode or forced current auxiliary anode system.

### 3.1.7

Auxiliary anode impressed-current anode an electrode used to supply current in a forced current cathodic protection system.

### 3.1.8

Power-off potential instant-OFF potential Instantaneous power-off potential to test the no-IR drop potential, the potential measured immediately after the short-term delay of the loop current interruption.

### 3.1.9

#### IR drop IR drop

The product of all current and loop resistance (mainly electrolyte resistance and pipe resistance) in the cathodic protection circuit.

### 3.1.10

#### Polarized potential

No IR drop potential Eliminate the potential of the tube to the electrolyte after the IR drop caused by the cathodic protection current or other current.

### 3.1.11

Insulation device isolating/insulating devices it is used to isolate electrical continuity between metals, and refers to special accessories and processed parts.

### 3.1.12

Linear anode linear auxiliary anode the anode body consists of a linear, continuous anode material filled with coke filler around the anode material and pre-packaged in the fabric overlay and Wear-resistant woven mesh.

For example, a conductive polymer linear anode, a mixed metal oxide (MMO-Ti) linear anode.

### 3.1.13

#### Test pile test post

A facility located along the buried pipeline for monitoring and testing the cathodic protection parameters of the pipeline.

### 3.1.14

Power-on potential ON potential the pipe-to-electrolyte potential measured during