

ICS 25.020

CCS J 59



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

**GB/T 45376-2025**

---

**Electroforming process specification for nickel and copper  
products**

镍和铜电铸工艺规范

**Issued on: March 28, 2025**

**Implemented on: October 1, 2025**

---

**Issued by: State Administration for Market Regulation;  
Standardization Administration of the PRC**

## Table of Contents

|                                                                                                                            |   |
|----------------------------------------------------------------------------------------------------------------------------|---|
| 1 Scope .....                                                                                                              | 1 |
| 2 Normative references .....                                                                                               | 1 |
| 3 Terms and Definitions .....                                                                                              | 1 |
| 4 Process requirements .....                                                                                               | 2 |
| 4.1 Process .....                                                                                                          | 2 |
| 4.2 Mandrel preparation .....                                                                                              | 2 |
| 4.3 Core mold pretreatment .....                                                                                           | 2 |
| 4.4 Electroforming .....                                                                                                   | 3 |
| 4.5 Post-processing of electroforming .....                                                                                | 4 |
| 5 Product quality inspection .....                                                                                         | 4 |
| 5.1 Alternative specimen .....                                                                                             | 4 |
| 5.2 Appearance .....                                                                                                       | 5 |
| 5.3 Surface roughness .....                                                                                                | 5 |
| 5.4 Chemical composition .....                                                                                             | 5 |
| 5.5 Porosity .....                                                                                                         | 5 |
| 5.6 Hardness .....                                                                                                         | 5 |
| 5.7 Thickness .....                                                                                                        | 5 |
| 5.8 Internal stress .....                                                                                                  | 5 |
| 5.9 Binding Strength .....                                                                                                 | 5 |
| 5.10 Conductivity .....                                                                                                    | 6 |
| 7 Appendix B (Informative) Commonly used electrolytic solutions and mechanical properties of electroforming products ..... | 9 |

## Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed by the China Machinery Industry Federation. This document is under the jurisdiction of the National Technical Committee for Standardization of Special Processing Machine Tools (SAC/TC161). This document was drafted by: Henan Polytechnic University,

China Banknote Design and Platemaking Co., Ltd., Suzhou Electrical Machine Tool Research Institute Co., Ltd., Nantong Mei Precision Electronics Co., Ltd., Nanjing University of Aeronautics and Astronautics, Xiamen Institute of Standardization, Dongguan Sino-Gold Etching Technology Co., Ltd., Henan Xin Chang Electric Technology Co., Ltd., Xi'an Jiaotong University, Huayi Bearing Technology (Jiangsu) Co., Ltd. The main drafters of this document are. Ming Pingmei, Yan Liang, Liu Xuejing, Zhang Hao, Guo Wenhua, Wang Ying, Zhou Tao, Qu Ningsong, Wang Shaowu, Qin Ge, Wu Yue, Zhang Liangqi, Chai Xingchen, Dai Xingyue. Nickel and copper electroforming process specifications

## 1 Scope

China's national process specification for electroforming nickel and copper products. Electroforming builds a part by depositing metal electrolytically onto a mandrel and then separating the two, and it is the only process that produces certain things at all: seamless thin-walled shells, precision meshes and screens, mould inserts that reproduce a surface texture exactly, and the nickel stampers from which optical discs were replicated. What it offers is fidelity - the deposit copies the mandrel to a fraction of a micrometre, including surface finish - and thicknesses no machining could hold. Its difficulties are all in the control: internal stress in the deposit can curl a part off the mandrel or crack it, thickness varies with current distribution over the shape, and separating the part without damaging either it or the reusable mandrel is a process in itself. The standard covers the process flow, mandrel preparation and pretreatment, process control, post-treatment and quality inspection.

This document specifies the electroforming process flow, core mold preparation, core mold pretreatment, electroforming process control and electroforming post-treatment of nickel and copper products. The operational requirements of this link are described, and the quality inspection method of electroformed products is described. This document applies to nickel and copper electroforming processes.

## 2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 3138 Terminology for surface treatment of metals and other inorganic coatings

GB/T 5270-2005 Review of test methods for adhesion strength of electrodeposited and chemically deposited metal coatings on metal substrates

GB/T 6463-2005 Review of the measurement method for thickness of metal and other inorganic coatings

GB/T 7220-2004 Product geometry specification (GPS) Surface structure profile method  
Surface roughness terminology parameters Measurement

GB/T 9790-2021 Vickers and Knoop microhardness test for metallic materials, metals and  
other inorganic coatings

GB/T 12332-2008 Nickel electroplating for metal coating engineering

GB/T 12609-2005 Sampling procedures for counting inspection of electrodeposited metal  
coatings and related finishes

GB/T 14896.1 Terminology of special processing machine tools Part

### **3 Terms and definitions**

The terms and definitions defined in GB/T 3138, GB/T 14896.1 and GB/T 14896.6 and the  
following apply to this document.

3.1 Electroforming A processing method that uses the principle of electrochemical cathode  
deposition to manufacture structures or parts.

3.2 Mandrel A mold used to replicate a structure or shape during electroforming.

3.2.1 reusable mandrel A core mold that can be used repeatedly.

3.2.2 Disposable mandrel A core mold that loses its original function after being used once.

### **6 Other special processing machine tools**

GB/T 31563-2015 Metal coating thickness measurement scanning electron microscope  
method

GB/T 32791-2016 Eddy current test method for electrical conductivity of copper and copper  
alloys