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**Method for evaluating the nodularity  
of spheroidal carbides — Steels for  
cold heading and cold extruding**



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 4, *Heat treatable and alloy steels*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

The nodularity of spheroidal carbide is an important characteristic of steel for cold heading or cold extruding. However, the degree of spheroidization is assessed with reference to an agreed series of standard images, which does not exist up-to-now as subject of an International standard. Thus, there has been a continuing debate between supply and demand for the determination of the degree of spheroidization.

This document specifies a test method for evaluating the degree of spheroidal carbide in CHQ wire (Cold Heading Quality wire).



# Method for evaluating the nodularity of spheroidal carbides — Steels for cold heading and cold extruding

## 1 Scope

This document specifies a micrographic method based on comparison charts for determining the degree of spheroidisation of carbides after annealing of wire rod, wire or bars made of non-alloy and low alloy steels intended for cold heading and cold extrusion. The range of carbon content is up to 1,20 % C.

In addition, [Annex A](#) includes a method based on machine vision for routine measurements.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4954, *Steels for cold heading and cold extruding*

## 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

#### maximum Féret diameter

maximum length of an object whatever its orientation, as shown in [Figure 1](#)

### 3.2

#### roundness

area of the carbide particle divided by the area of the circle whose diameter is the maximum Féret diameter of the same carbide particle, calculated according to [Formula \(1\)](#):

$$\text{Roundness} = A/A_m = 4A/\pi \cdot l_m^2 \quad (1)$$