

ICS 77.040.99



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

GB/T 10561-2023

**Determination of content of nonmetallic inclusions in steel -
Micrographic method using standard diagrams
(English Translation)**

Issued on: May 23, 2023

Implemented on: December 1, 2023

Issued by: State Administration for Market Regulation

Table of Contents

Foreword...	3
1 Scope...	6
2 Normative references...	6
3 Terms and definitions...	6
4 Principles...	7
5 Sampling...	9
6 Specimen preparation...	15
7 Determination methods...	15
8 Result representation...	19
9 Test report...	20

Foreword

This document was drafted in accordance with the provisions of GB/T 1.1-2020

"Directives for standardization - Part 1.Rules for the structure and drafting of standardizing documents".

This document replaces GB/T 10561-2005 "Determination of content of nonmetallic inclusions in steel - Micrographic method using standard diagrams". Compared with GB/T 10561-2005, in addition to structural adjustments and editorial changes, the main technical changes are as follows.

- a) ADD the terms and definitions (see Chapter 3);
- b) CHANGE the description of characteristics of category C (silicate) and category DS inclusions (see 4.1; Chapter 2 of the 2005 edition);
- c) ADD the total length (or quantity or diameter) of various inclusions of grade 3.5, grade 4.0, grade 4.5, grade 5.0 (see Table 1);
- d) CHANGE the minimum width of category D inclusions (see Table 2; Table 2 of the 2005 version);
- e) CHANGE the sampling method and schematic diagram of steel pipes [see Figure 2g, Figure 2h); Appendix NA of the 2005 edition];

- f) ADD the Method B observation sample scanning diagram (see 7.2.1.2);
- g) CHANGE the general principles of Method A and Method B (see 7.2.2; 5.2.3 of the 2005 edition);
- h) ADD the evaluation conditions for precipitated phases (see 7.2.2.8; Chapter 2 of the 2005 edition);
- i) CHANGE the method of expressing results (see Chapter 8; Chapter 6 of the 2005 edition);
- j) CHANGE the measurement values of inclusions, the calculation formulas for grades, the relationship diagram between rating picture grades and measured inclusion values (see Appendix B; Appendix D of the 2005 version);
- k) CHANGE the standard pictures of some grades, adding the scales (see Appendix C; Appendix A of the 2005 edition);
- l) ADD the examples of inclusion assessment (see Appendix D);
- m) ADD the calculation formula for the average grade imoy of method B, as well as the weighting factors of grade 3.5, grade 4.0, grade 4.5, grade 5.0 (see E.2 and E.3).

This document modifies and adopts ISO 4967.2013 "Steel - Determination of content of nonmetallic inclusion - Micrographic method using standard diagrams".

Compared with ISO 4967.2013, this document has made the following structural adjustments.

- ADD the Chapter 2 and Chapter 3;
- The Chapter 4 corresponds to Chapter 2 in ISO 4967.2013; subsequent chapter numbers are postponed;
- Appendix B corresponds to Appendix D in ISO 4967.2013;
- Appendix C corresponds to Appendix A in ISO 4967.2013;
- Appendix D corresponds to Appendix B in ISO 4967.2013;
- Appendix E corresponds to Appendix C in ISO 4967.2013.

Compared with ISO 4967.2013, this document has many technical differences. The

involved clauses are marked with a single vertical line (|) in the outer margin. A list of these technical differences and their reasons is as shown in Appendix A.

Change the English translation of ISO standard names.

Please note that some content in this document may be subject to patents. The publisher of this document assumes no responsibility for identifying patents.

This document was proposed by the China Iron and Steel Industry Association.

This document shall be under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC 183).

Drafting organizations of this document. Baowu Special Metallurgy Co., Ltd., Metallurgical Industry Information Standards Institute, Institute of Metal Research, Chinese Academy of Sciences, Shougang Group Co., Ltd., Iron and Steel Research Institute Co., Ltd., Oupotong Technology Industry Co., Ltd., Jiangsu Yonggang Group Co., Ltd., Jiangyin Xingcheng Special Steel Co., Ltd., Chengde Jianlong Special Steel Co., Ltd., Delong Steel Co., Ltd., Fushun Special Steel Co., Ltd., Lvliang Jianlong Industrial Co., Ltd., Xining Special Steel Co., Ltd.

1 Scope

This document gives information on the principles, sampling, specimen preparation, determination, result expression, test reports for the evaluation of non-metallic inclusions in steel, using standard rating charts; provides an image analysis method for the determination of non-metallic inclusions (see appendix B).

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, for dated reference documents, only the version corresponding to the date applies to this document; for undated reference documents, the latest version (including all amendments) applies to this document.

GB/T 13298 Inspection methods of microstructure for metals

GB/T 30067 Standard terminology relating to metallography

3 Terms and definitions

The terms and definitions, which are defined in GB/T 30067, as well as the following terms and definitions, apply to this document.

The ratio -- of length to width of an individual particle.

The maximum size of spherical particles.

4.5 For the evaluation of precipitated phases, such as titanium nitride, titanium carbonitride, boride, carbide, other carbonitride compounds or nitrides, they can also be compared with the category B, category C, category D, category DS inclusions, based on their morphology. Indicate their chemical characteristics with subscripts below.

Note: Before conducting the test, non-traditional category of inclusions and precipitates are generally inspected, at a magnification greater than 100x, to determine their chemical characteristics.

5.4 Sampling methods shall be as specified in product standards or agreement. If not

specified in the product standard or agreement, the sampling method shall be as follows.

6.3 When polishing the specimen, the peeling and deformation of inclusions or the

contamination of the polished surface shall be avoided, to ensure that the inspection surface is clean and the shape of the inclusions is not affected. The above operating points are especially important, when the inclusions are small. In some cases, in order to achieve a higher hardness of the specimen, the specimen can be heat treated before polishing.

7.2.2.7 According to the requirements of product standards or agreements, the precipitated phase can be evaluated, according to its morphology, together with the closest category B, category C, category D, category DS inclusions. Its chemical characteristics can be expressed according to the method of 7.2.2.6. For examples of evaluation of precipitated phases, see D.4.