

ICS 77.040.30

CCS H 24



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

GB/T 13302-1991

**Steel - Determination of the area content of graphite -
Micrographic method using diagrams**

钢中石墨碳显微评定方法

Issued on: January 2, 1991

Implemented on: October 1, 1992

Issued by: State Bureau of Technical Supervision

Table of Contents

1 Scope
2 Normative references
3 Principle
4 Sampling
5 Preparation of the specimen
6 Examination
7 Rating against the reference diagrams
8 Test report
About this edition
Classification and status
How a Chinese national standard is set out
About this English translation

1 Scope

This standard specifies the micrographic method for determining the area content of graphite in steel by comparison with a series of reference diagrams.

What graphitisation is, and where it happens

Carbon in steel is normally present as carbide. Under certain conditions it comes out of solution as free graphite instead, and where it does the steel loses strength and - far more importantly - loses toughness.

It occurs in carbon and carbon-molybdenum steels held for long periods at around four to five hundred degrees. That is precisely the condition of steam pipework, headers and their welds in a power station, and the graphite forms preferentially in the heat affected zone beside a weld, in a plane, producing a brittle path across the section. Pipes have failed catastrophically that way.

Why diagrams rather than measurement

What matters is not only the amount of graphite but its size and, above all, its distribution - whether it is dispersed through the structure or aligned in a chain.

A chart comparison captures that pattern in a way a numerical area fraction alone would not, which is why an old method of this kind remains current rather than being replaced by

image analysis.

And where the specimen comes from

For a weld examination that is the whole question. Graphite forms in a specific narrow zone, and a specimen taken a few millimetres away shows nothing at all.

The standard sets the sampling and the location, the preparation and polishing, the examination conditions and magnification, the reference diagrams and the rating scale, and how the result is reported.

About this edition

GB/T 13302-1991 is the current edition. It was issued on 2 January 1991 and has been in force since 1 October 1992.

The interval between issue and effect is the transition period. It exists so that producers, laboratories and buyers can requalify products, revise procedures and use up documentation before the new text becomes the one that applies. The date on this page is the official one from the record of the Standardization Administration.

Classification and status

GB/T 13302-1991 is classified under ICS 77.040.30. ICS is the International Classification for Standards, the same scheme used by ISO and by the national bodies of most countries, which is what allows a Chinese standard to be placed beside its foreign counterparts on subject rather than on number.

Its Chinese Standard Classification code is CCS H 24. CCS is the domestic scheme, a letter for the sector and two digits for the subject within it, and it is the code by which the standard is filed and searched in China.

The GB/T prefix marks a recommended national standard. It is not, in itself, law: it becomes binding when a contract names it, when a regulation or a mandatory standard refers to it, or when a producer declares conformity with it. In practice that covers most of the cases in which it will be read - a purchase specification, an inspection agreement or a certification scheme.

How a Chinese national standard is set out

Chinese national standards are drafted to the rules of GB/T 1.1, which fixes the order in which a standard is set out. The document opens with a foreword recording the issuing bodies, the relationship to any previous edition and the technical committee responsible for it. Clause 1 is the scope. Clause 2 lists the normative references - the other standards that have to be applied together with this one, and without which its requirements cannot be

met. Clause 3 gives the terms and definitions. The technical clauses follow: the requirements themselves, the test or measurement methods by which conformity is established, the inspection rules that say how a lot is sampled and judged, and, for a product standard, the provisions on marking, packaging, transport and storage. Annexes, normative or informative, come last.

GB/T 13302-1991 runs to 15 pages in the English translation. What is delivered is the complete document in that order: every clause, every table, every figure and every annex of the Chinese original, with the same numbering, so that a reference to a clause number in a contract or a test report points to the same place in both languages.

About this English translation

The English edition of GB/T 13302-1991 is a full translation of the official Chinese text, not a summary, an abstract or a machine rendering left unchecked. Clause and subclause numbers, table and figure numbers and annex letters are those of the original, because they are what a specification, a purchase order or a test report cites.

Technical terms are translated against the vocabulary standards of the same field, so that a term used in GB/T 13302-1991 reads the same way as in the other Chinese standards it is used beside. Where a term has an established English form in an ISO or IEC document on the same subject, that form is used; where China's term has no foreign counterpart, it is translated literally and the Chinese is kept alongside it rather than replaced by an approximation.

Quantities, units and symbols are carried over unchanged. Chinese standards use SI, so a value in the translation is the value in the original document, not a conversion, and a limit read from the English text is the limit that will be applied by a Chinese inspection body reading the Chinese one.

This page is compiled from the official publication record: the standard number and both titles, the issuing bodies, the dates of issue and effect, the ICS and CCS classification. The requirements, limits, tables and test conditions are in the document itself.