International Standard ISO 7625

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Sintered metal materials, excluding hardmetals — Preparation of samples for chemical analysis for determination of carbon content

Matériaux métalliques frittés, à l'exclusion des métaux-durs — Préparation des échantillons pour analyse en vue du dosage du carbone

First edition — 1983-10-15

UDC 621.762.8 : 543.05 : 546.26 **Ref. No. ISO 7625-1983 (E)**

Descriptors : powder metallurgy, sintered products, sampling, specimen preparation, chemical analysis, determination of content, carbon.

Price based on 2 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 7625 was developed by Technical Committee ISO/TC 119, *Powder metallurgy*, and was circulated to the member bodies in October 1982.

It has been approved by the member bodies of the following countries:

Austria	France	South Africa, Rep. of
Bulgaria	Germany, F.R.	Spain
Canada	Italy	Sweden
China	Mexico	United Kingdom
Czechoslovakia	Poland	USA
Egypt, Arab Rep. of	Romania	USSR

No member body expressed disapproval of the document.

Sintered metal materials, excluding hardmetals — Preparation of samples for chemical analysis for determination of carbon content

0 Introduction

The chemical analysis of sintered metal materials, excluding hardmetals, is carried out as it would be for solid metals, by using existing standard methods. However, as these sintered materials very often contain carbonaceous constituents, the correct determination of carbon content (free or total) requires that certain precautions be taken when preparing the sample for analysis from components.

Samples prepared in accordance with this International Standard may also be suitable for chemical analysis for other elements.

1 Scope

This International Standard specifies methods for preparing a sample from one or more sintered parts to be analysed for free or total carbon content. Combined carbon is determined as the difference between total and free carbon. It covers the preparation of samples for the determination of carbon by a chemical method, i.e. combustion in oxygen and measurement of the carbon dioxide produced, in accordance with ISO 437. It does not cover the preparation of samples for carbon determination by physical methods, such as metallography or spectroscopy.

2 Field of application

This International Standard applies to parts in which carbon is uniformly distributed and present in the forms shown in table 1. It does not apply to parts in which the carbon is not uniformly distributed throughout the part.

NOTE — In instances where the carbon is not uniformly distributed, for example a case hardened part, the method of selecting the sample should be agreed between the supplier and the purchaser.

The presence of carbonaceous materials in the pores or on the surface of the part to be analysed interferes with the determination of carbon, see table 2.

Table 1 — Forms of carbon that can be determined by chemical analysis

Form of carbon	Typical materials	Comments
Combined carbon (as carbides or in solid solution)	Carbon-containing steels and superalloys	Determined as the difference between total and free carbon
Free carbon	Graphite-containing bronze, steels; material impregnated with a graphite-containing liquid	Determined by combustion of the residue of selective dissolution of the metal in the sample
Total carbon (sum of combined carbon and free carbon)		Determined by direct combustion of the sample

Table 2 — Origins of carbonaceous material and feasibility of carbon determination by chemical methods

Carbonaceous material	Origin	Feasibility
1 Liquid or semi-liquid organic substances on the surface or in the pores	Sizing lubricant, quenching oil, impregnating lubricant, cutting fluid, grease	Carbon determination is possible only when these organic substances are totally eliminated by the method described in clause 5
2 Waxes and wax-like substances	Sizing lubricant, corrosion protective	
3 Deposits of carbon on the parts	Sintering, heat treatment	
4 Solid organic substances, for example plastic materials on the surface or in the pores	Sealant material	In general, it is not possible to eliminate these substances and carbon determination is not possible

3 References

ISO 437, *Steel and cast iron — Determination of total carbon content — Combustion gravimetric method.*

ISO 2738, *Permeable sintered metal materials — Determination of density, oil content, and open porosity.*[1)]

4 Principle

Elimination of impregnated or surface carbon. Preparation of samples for analysis by fragmentation or machining, taking care not to lose any free carbon.

5 Procedure

5.1 Removal of interfering carbonaceous material

Carbonaceous materials (see table 2) that affect the carbon determination shall be removed from the part or parts to be analysed as follows.

5.1.1 Impregnated organic substances in the pores or on the surface (see cases 1 and 2 in table 2) shall be removed by Soxhlet degreasing with an appropriate solvent in accordance with ISO 2738. The solvent used shall be stated.

NOTE — When the impregnating liquid contains fine carbon particles, for example colloidal graphite, only a fraction of these particles may be removed by Soxhlet degreasing. In such a case the determination of free carbon and total carbon would be invalid, but calculation of combined carbon would still be valid if the free carbon and total carbon are determined on the same part or parts after degreasing.

5.1.2 Surface deposits of carbon (see case 3 in table 2) shall be removed by mechanical treatment.

5.2 Final preparation

The sample for analysis shall consist of small fragments of a size appropriate to the analysis method to be used, prepared by one of the following methods:

— crushing in a mortar made of a material which does not alter the sample composition;

— drilling, milling or turning. Such machining shall be performed dry. Care shall be taken to avoid overheating, oxidation and contamination of the fragments. Where drilling is used, the part shall be drilled completely through and the distribution of drilling holes shall be uniform over the whole surface of the part. If the part is too thick, the holes shall be drilled to the middle from both faces of the part.

Where fragments, crushed or machined, contain fine particles (for example free graphite), care shall be taken not to lose these particles during handling.

NOTE — Where segregation is expected to be a problem, the entire sample should be analysed after being divided into a suitable number of test portions. The carbon content is then calculated as the average of the results from each portion.

In general, a sufficient quantity of fragments, representative of the part or parts, shall be prepared. The samples for analysis shall be kept in a glass container, tightly sealed, in order to avoid contamination.

1) At present at the stage of draft. (Revision of ISO 2737-1973 and ISO 2738-1973.)