
International Standard



5949

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Tool steels and bearing steels — Micrographic method for assessing the distribution of carbides using reference photomicrographs

Aciers à outils et aciers de roulement — Méthode micrographique d'évaluation de la répartition des carbures à l'aide d'images-types

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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 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 5949 was developed by Technical Committee ISO/TC 17, *Steel*, and was circulated to the member bodies in September 1982.

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

Australia	Ireland	Portugal
Austria	Italy	South Africa, Rep. of
Belgium	Japan	Spain
Czechoslovakia	Kenya	Sweden
Egypt, Arab Rep. of	Korea, Dem. P. Rep. of	Tanzania
France	Korea, Rep. of	Turkey
Germany, F.R.	Netherlands	United Kingdom
Hungary	New Zealand	USA
India	Norway	
Iran	Poland	

No member body expressed disapproval of the document.

Tool steels and bearing steels — Micrographic method for assessing the distribution of carbides using reference photomicrographs

1 Scope and field of application

This International Standard specifies the micrographic method for assessing the distribution of carbides in tool and bearing steels, with C levels between 0,1 % and 1,5 % and a total content of alloy elements less than or equal to 5 %. The use of this method for other steels shall be subject to special agreement.

2 References

ISO 683/17, *Heat-treated steels, alloy steels and free-cutting steels — Part 17: Ball and roller bearing steels.*

ISO 4957, *Tool steels.*

3 Principles of the method

3.1 The distribution of carbide is assessed by comparison with the reference photomicrographs given in the plate in the annex.

3.2 The reference photomicrographs are divided into four main series¹⁾ according to shape, dimensions and the distribution of carbides :

- series NA relating to the distribution of carbides at grain boundaries in the annealed condition;
- series NH relating to the distribution of carbides at grain boundaries in the quenched and tempered condition;
- series LE relating to carbide streaking of enclosed shape. Only heavy carbide streaking is taken into consideration;
- series LD relating to carbide streaking of diffused shape.

3.3 Each series is made up of 10 reference photomicrographs which represent the increasing levels of carbides. These photomicrographs are marked by the figures 0 to 9, the figures increasing with the quantity of carbides.

According to the series, these photomicrographs correspond to field sizes of :

0,08 mm observed at a magnification of 1 000 for series NA;

0,4 mm observed at a magnification of 200 for series NH;

0,8 mm observed at a magnification of 100 for series LE and LD;

3.4 The characteristic number for the distribution of carbides is made up of the symbol of the series taken for reference and the number of the photomicrograph corresponding to the field observed.

4 Sampling

4.1 Samples are generally taken from rounds, bars and wide flats. Sampling shall be carried out so that the surface to be examined coincides with the direction of greatest elongation of the steel so that it is possible to observe the carbides in the longitudinal direction, the surface observed being parallel to the metal fibre. In the case of assessment using series NA and NH, the surface examined may also be taken perpendicular to the metal fibre, i.e. in a transverse section.

In the absence of any indication in the International Standard for the product, the method of sampling in the case of rounds or bars may be that specified in the figure.

The polished surface of the sample used for assessing the distribution of carbides shall be approximately 100 mm². Its posi-

1) The symbols NA, NH, LE and LD are derived from the English terminology, as follows :

N : Network (in French : réseau);

A : Annealed condition (in French : à l'état recuit);

H : Hardened condition (in French : à l'état trempé et revenu);

L : Lines (in French : alignements);

E : Enclosed shape (in French : de forme nette);

D : Diffused shape (in French : de forme diffuse).