INTERNATIONAL STANDARD ISO 3955

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Sintered metal materials, excluding hardmetals — Sampling

Matériaux métalliques frittés, à l'exclusion des métaux-durs — Échantillonnage

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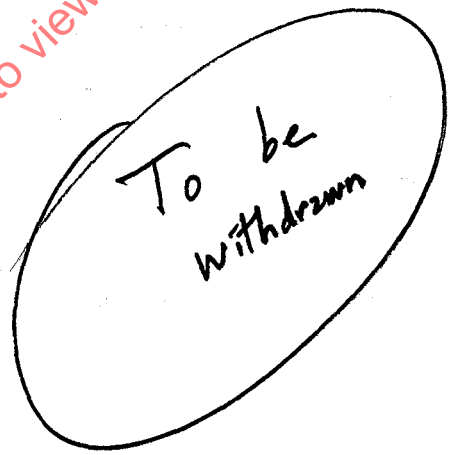

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (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 set up 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 3955 was developed by Technical Committee ISO/TC 119, *Powder metallurgical materials and products*, and was circulated to the member bodies in October 1975.

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

Australia	Germany	Spain
Austria	Italy	Sweden
Brazil	Japan	Turkey
Canada	Mexico	U.S.A.
Czechoslovakia	Portugal	U.S.S.R.
France	Romania	Yugoslavia

The member body of the following country expressed disapproval of the document on technical grounds :

United Kingdom

Printed in Switzerland

Sintered metal materials, excluding hardmetals — Sampling

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies procedures for the sampling of sintered metal materials, excluding hardmetals, for the inspection of dimensions and mechanical , physical and chemical properties.

2 REFERENCES

ISO 2859, *Sampling procedures and tables for inspection by attributes.*

ISO 3534, *Statistics — Vocabulary and symbols.*

3 PRINCIPLE

The acceptable quality level (AQL) of a lot is determined by inspecting the relevant properties of the units of product of a sample taken in accordance with an established procedure agreed between the interested parties.

Standard statistical sampling plans are recommended.

4 DEFINITIONS

According to ISO 2859 and ISO 3534.

5 PROCEDURE

5.1 General rules

Before sampling commences, the following points shall be agreed between the interested parties :

— the properties to be inspected, their values and tolerances;

— the method of measurement for each property inspected;

— the establishment of a statistical sampling plan, or of an empirical sampling plan, and the acceptance and rejection criteria.

NOTE — The interested parties may use different sampling plans provided that the statistical efficiency of the plans is the same.

The sample shall be taken randomly in the inspection lot and each property shall be inspected and considered separately. The number of defectives in the sample for each property shall be counted and compared with the acceptance and rejection criteria.

5.2 Dimensional control

For dimensional control, standard statistical sampling plans shall preferably be used in accordance with the general rules of 5.1. Such plans are given as examples below; however, other plans may be applicable.

Tables 1 and 4 for single sampling correspond to table 2A, in ISO 2859.

Tables 2 and 5 for double sampling correspond to table 3A, in ISO 2859.

5.2.1 *Single sampling plan — tables 1 and 4*

The number of units of product inspected, n, shall be equal to the sample size given by the plan. If the number of defectives found in the sample, d, is equal to or less than the acceptance number, c, the lot shall be considered acceptable. If the number of defectives is equal to or greater than the rejection number, r, the lot shall be rejected.

5.2.2 *Double sampling plan — tables 2 and 5*

The number of units of product inspected shall be equal to the first sample size, n_1, given by the plan. If the number of defectives found in the first sample, d_1, is equal to or less than the first acceptance number, c_1, the lot shall be considered acceptable. If the number of defectives found in the first sample, d_1, is equal to or greater than the first rejection number, r_1, the lot shall be rejected.

If the number of defectives found in the first sample, d_1, is between the first acceptance and rejection numbers, a second sample of the size given by the plan, n_2, shall be inspected. The number of defectives found in the first, d_1, and second samples, d_2, shall be accumulated, $d_1 + d_2$. If the cumulative number of defectives is equal to or less than the second acceptance number, c_2, the lot shall be considered acceptable. If the cumulative number of defectives is equal to or greater than the second rejection number, r_2, the lot shall be rejected.

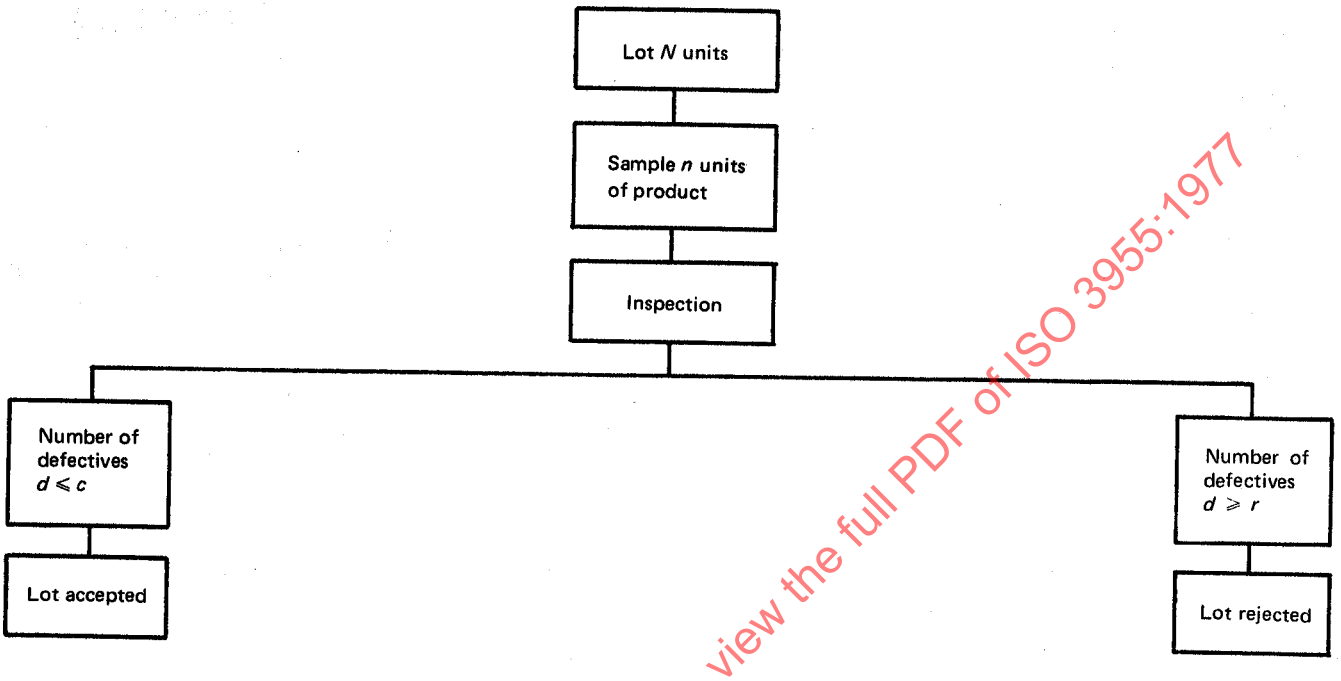

TABLE 1 – **Single sampling plan**

Possibilities				
	First sample		Second sample	
Accept	A	$d_1 \leqslant c_1$	D	$d_1 + d_2 \leqslant c_2$
Inspect further	B	$c_1 < d_1 < r_1$		
Reject	C	$d_1 \geqslant r_1$	E	$r_2 \leqslant d_1 + d_2$

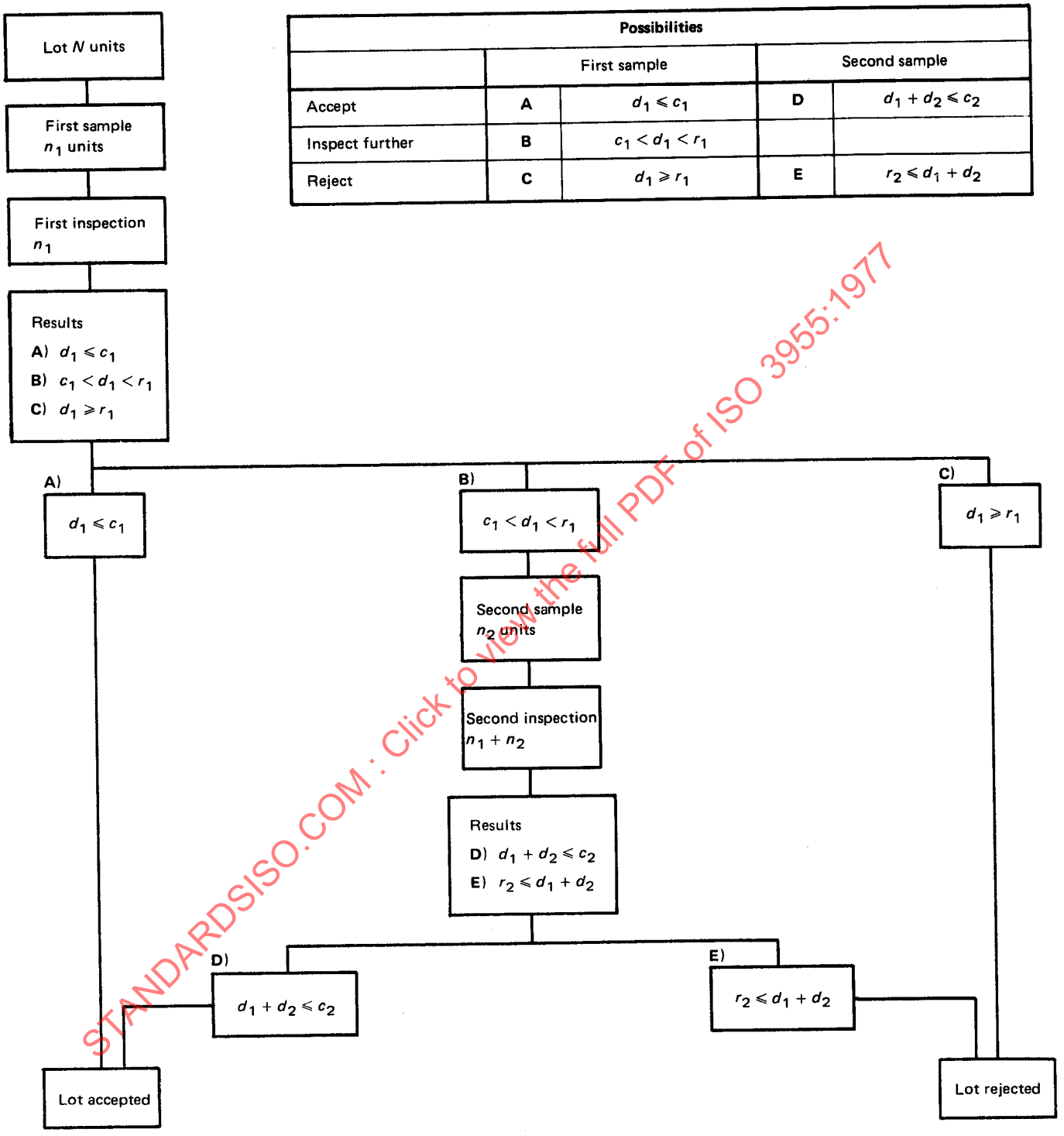

TABLE 2 — **Double sampling plan**

5.3 Control of physical, mechanical and chemical properties

As the determination of physical, mechanical and chemical properties is usually more complicated and very often of a destructive nature, it is neither desirable nor practical to employ a sample quantity comparable to that normally employed for checking dimensional features.

The nature of the tests to be carried out, as well as the procedure for accepting and rejecting items to be checked in a lot, shall be the result of an agreement between the interested parties.

Table 3 is a guide to the minimum number of samples from each inspection lot that should be taken for each particular test.

It is permissible in certain cases to carry out tests of more than one property on the same unit of product.

TABLE 3 – **Minimum number of samples**

Property to be inspected	Minimum number of units of product to be taken from each inspection lot
Hardness	5
Other mechanical properties[1)]	2
Density	2
Porosity	2
Oil content	2
Metallurgical structure	2
Chemical composition	As necessary to obtain a suitable mass of sample for the elements to be determined
Properties shall be determined according to the appropriate International Standards, where such exist	

1) With regard to the mechanical properties, the following points have to be considered :

a) The valid determination of the properties of the material constituting a lot (for example tensile strength, transverse rupture strength, modulus of elasticity) can only be envisaged in one or other of the following cases :

— the piece from an inspection lot has a form and dimensions such that it constitutes a test piece (for example a bush for a radial crushing test).

— it is possible to machine an appropriate mechanical test piece out of the sample piece.

b) When it is required to know the performance characteristics of the units of products of an inspection lot, special tests relevant to the performance of these units shall be made directly on them. In this case, test methods shall be agreed between the interested parties.

In general, the evaluation of the mechanical properties of the material constituting an inspection lot cannot be effected by testing separately prepared test pieces even though they are compacted and sintered together with an inspection lot, since it cannot be guaranteed that the material of the test pieces actually tested possesses identical characteristics to those of the units of product that constitute the inspection lot.