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# INTERNATIONAL STANDARD



# 3954

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

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## Powders for powder metallurgical purposes — Sampling

*Poudres pour emploi en métallurgie des poudres — Échantillonnage*

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## FOREWORD

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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 3954 was developed by Technical Committee ISO/TC 119, *Powder metallurgical materials and products*, and was circulated to the member bodies in October 1975.

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

Austria	Japan	Turkey
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No member body expressed disapproval of the document.

# Powders for powder metallurgical purposes – Sampling

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### 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies procedures for the sampling of powders for powder metallurgical purposes. It also covers the splitting of the sample into the quantity required for testing.

### 2 REFERENCES

ISO 78, *Guide on the form for standards for chemical products and for methods of chemical analysis.*

ISO 3081, *Iron ores – Increment sampling – Manual method.*

### 3 DEFINITIONS

The following definitions are in accordance with ISO 3081 and ISO 78.

**3.1 lot :** A quantity of powder processed or produced under conditions which are presumed uniform.

**3.2 increment :** A quantity of powder obtained by a sampling device at one time from a single lot.

**3.3 gross sample :** The quantity of powder consisting of all the increments taken from a single lot.

**3.4 composite sample :** The blended entire gross sample or a representative part thereof. Alternatively it may be obtained by splitting the lot. However it is obtained, it should be thoroughly blended.

**3.5 test sample :** A quantity of powder taken from the composite sample for determining a single property or for preparing the test pieces. It should normally be taken by splitting the composite sample.

**3.5.1 test portion :** A definite quantity of powder drawn from the test sample (or, if both are the same, from the composite sample) and on which the test is carried out.

**3.5.2 test piece :** An object of specified form prepared from a test sample.

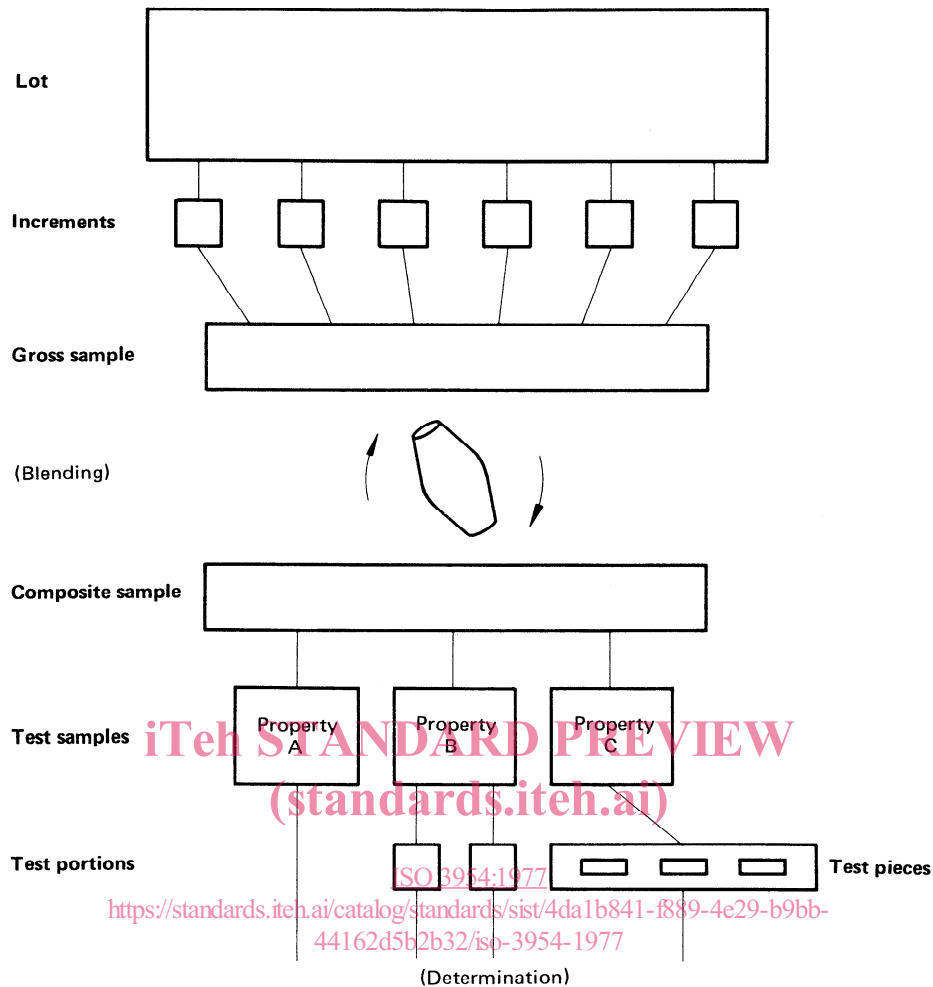


FIGURE 1 – Scheme of sampling

**4 NUMBER OF INCREMENTS**

**4.1 Sampling from powders packaged in containers**

Unless otherwise agreed, the number of containers listed in the table shall be selected at random from the lot when samples are taken from powder packaged in containers. One or more increments shall be taken from every selected container to provide a gross sample. If containers holding different quantities are included in the lot, the containers selected shall be representative of the lot and the number of increments taken from every selected container shall be in proportion to the content of the container.

**4.2 Sampling during discharge in continuous stream**

If the entire lot is discharged in a continuous stream through an opening, it may be sampled during discharge. In such a case, increments shall be taken at regular intervals during the entire discharge period. The number of in-

Number of containers in the lot	Number of containers from which increments shall be taken
1 to 5	all
6 to 11	5
12 to 20	6
21 to 35	7
36 to 60	8
61 to 99	9
100 to 149	10
150 to 199	11
200 to 299	12
300 to 399	13

For every additional 100 containers or portion thereof in the lot, one additional container shall be sampled.

crements shall depend on the accuracy desired. At least three increments shall be taken, one shortly after discharging commences, one half-way through the discharge period and one shortly before discharging is completed.

## 5 SAMPLING

### 5.1 General

Increments shall be taken in such a manner that the composite sample will be representative of the lot as accurately as possible.

NOTE — Demixing may occur at any time when a batch of powder is set in motion, for example when filling containers, emptying containers, during transportation and if subjected to vibrations during storage.

All the surfaces of a sampling device which comes into contact with the powder shall be smooth and clean.

### 5.2 Sampling procedures

The sampling procedure shall be such that the powder properties are not changed.

#### 5.2.1 Sampling by splitting the lot

The device and procedure mentioned in 5.3 are used for splitting the lot.

#### 5.2.2 Sampling during discharge in continuous stream

The dimensions of the sampling container at right angles to the stream of powder shall exceed the cross-section of the stream by an ample margin.

The sampling container shall be exposed to the powder stream and withdrawn in such a manner that all portions of the stream have an equal chance of entering it.

NOTE — The simplest method of achieving this is to move a container of rectangular cross-section across the stream at constant speed.

#### 5.2.3 Sampling with sampling thieves

Different types of sampling thief can be used. The length of the thief shall be such that it allows extraction of powder from all levels in the container. The design depends on the flow properties of the powder from which the sample is to be taken. Two examples are shown in figures 2 and 3.

5.2.3.1 The sampling thief according to figure 2 is suitable only for loosely packed powder with a high flowability. It comprises an inner and an outer tube with closed end and longitudinal slit-shaped windows positioned so that they are opened and closed successively as the tubes are twisted relative to each other. The tubes shall fit each other loosely enough for twisting not to be hindered by the largest particles encountered.

The sampling thief shall be inserted all the way to the bottom of the container with the windows closed. It is recommended that it be inserted in the direction which was vertical during transportation and storage. When the thief has reached the bottom, the windows shall be opened so that the thief is filled from bottom to top, after which the windows shall be closed and the thief withdrawn. The contents of the thief shall be emptied into the gross sample container.

5.2.3.2 The sampling thief according to figure 3 comprises a single tube with opened end. It is suitable for powders which remain inside the tube when it is withdrawn. This condition may be fulfilled by selecting a suitable tube diameter.

The sampling thief shall be inserted slowly all the way to the bottom of the container. It is recommended that it be inserted in the direction which was vertical during transportation and storage. When the thief has reached the bottom, it shall be withdrawn and its contents emptied into the gross sample container.

#### NOTES

1 If the depth of powder is greater than the height of the windows of the thief, more than one increment shall be taken so that the powder is sampled at every depth, the number of increments being a multiple of the ratio of the depth of the powder to the height of the window.

2 If demixing has occurred in the direction in which the thief is inserted, errors will occur if the thief does not withdraw an equal quantity from every stratum.

3 To reduce the effect of demixing at right angles to the direction of the thief insertion, the points of insertion shall be distributed as representatively as possible. For example, if several increments are taken from the contents of a single cylindrical container, the number of increments taken at each distance from the axis of the container shall be proportional to that distance.

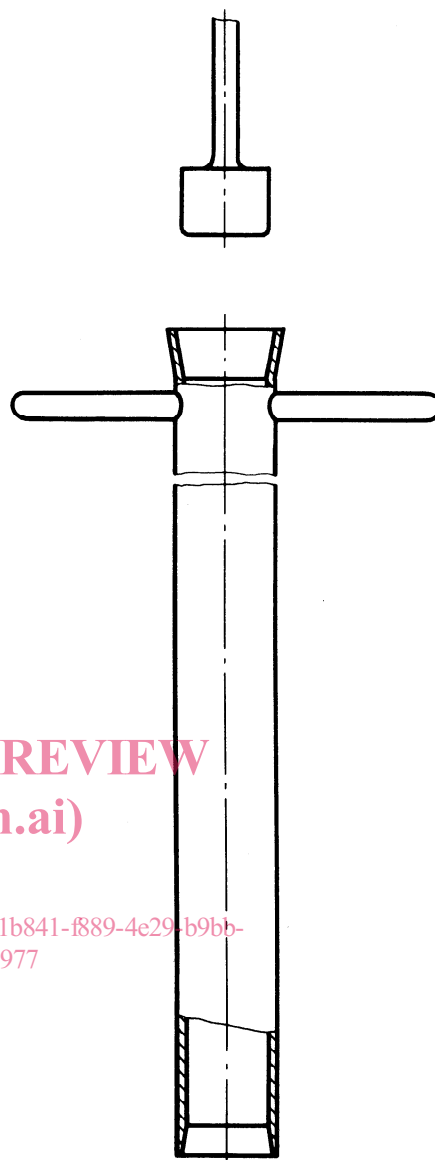
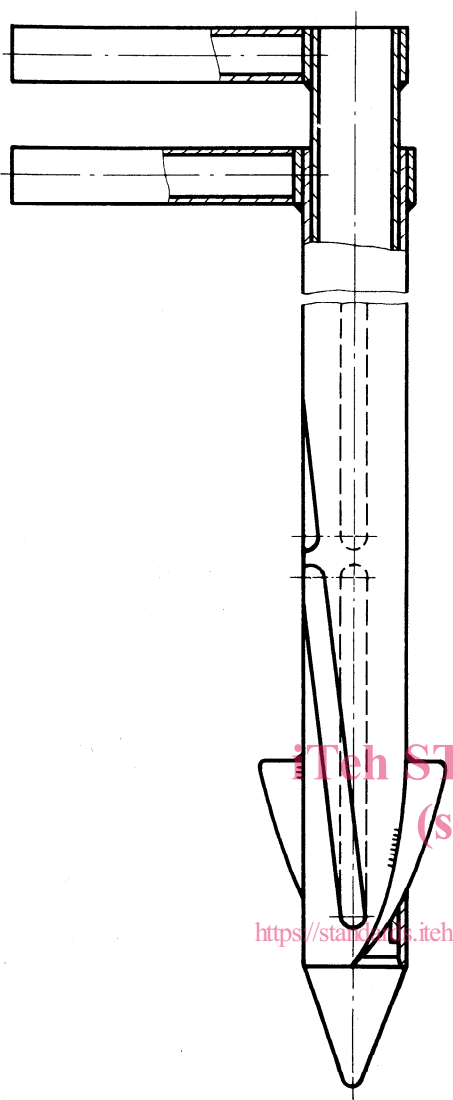
If only one increment is to be taken from the content of a cylindrical container, the thief shall be inserted at a distance from the centre equal to 0,7 of the radius.

### 5.3 Sample splitting

The device for splitting samples shall be of the proper size for the amount of powder being split so that handling losses may be disregarded and contamination minimized. The following devices have been found suitable :

- 1) quartering device;
- 2) sample splitter;
- 3) rotary sample splitter;
- 4) rotating cone sample splitter.

Examples are shown in figures 4 to 7.



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FIGURE 2 – Sampling thief

FIGURE 3 – Sampling thief

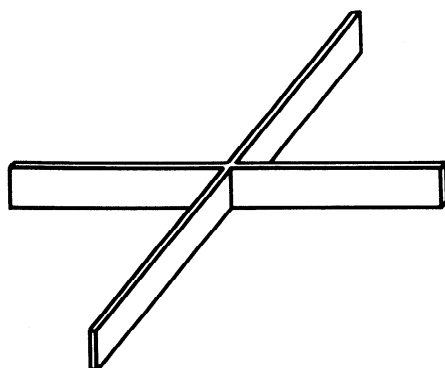
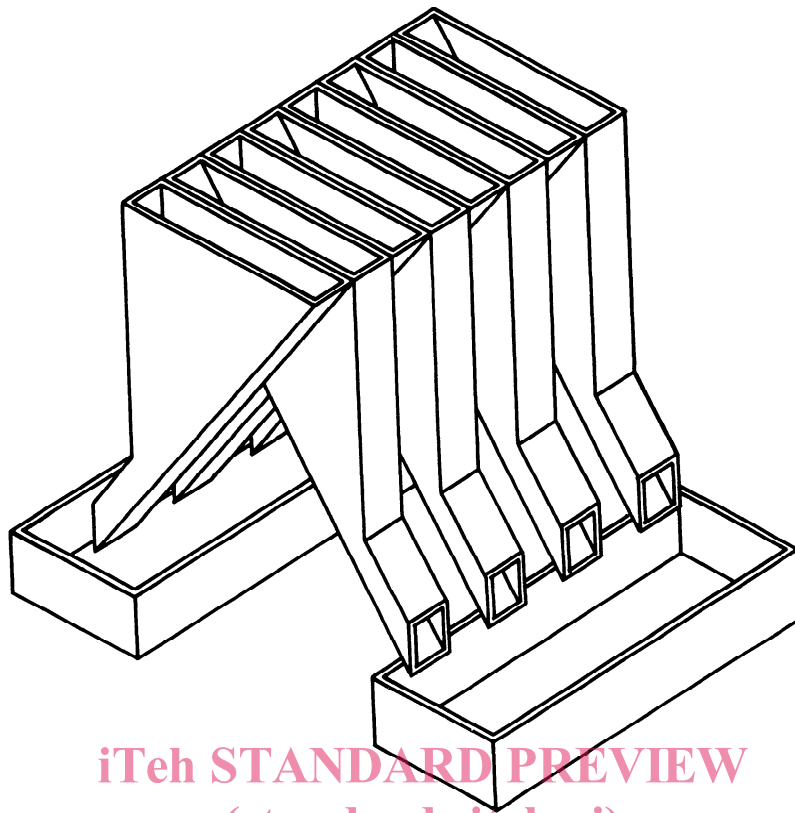


FIGURE 4 – Quartering device



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FIGURE 5 – Sample splitter

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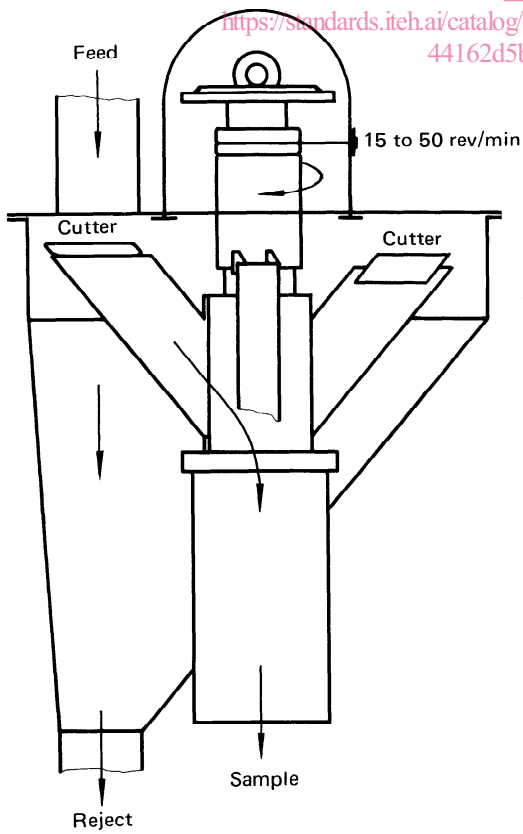


FIGURE 6 – Rotary sample splitter

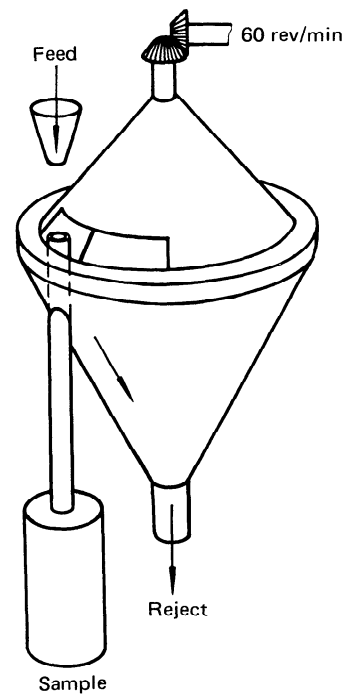


FIGURE 7 – Rotating cone sample splitter

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