International Standard 7451

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Earth-moving machinery — Hydraulic excavators — Hoe type buckets — Volumetric ratings

Engins de terrassement — Godets de pelles hydrauliques travaillant en rétro — Évaluations volumétriques

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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 7451 was developed by Technical Committee ISO/TC 127, *Earth-moving machinery*, and was circulated to the member bodies in September 1981.

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

Australia	France	South Africa, Rep. of
Austria	Germany, F.R.	Sweden
Belgium	India	United Kingdom
Brazil	Italy	USA
Bulgaria	Poland	USSR
Czechoslovakia	Romania	

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

Japan

Printed in Switzerland

Earth-moving machinery — Hydraulic excavators — Hoe type buckets — Volumetric ratings

1 Scope and field of application

1.1 This International Standard specifies a procedure for approximating the volume of typical materials contained in the hoe type buckets of excavators as defined in ISO 7135. The volume ratings are based on the inside dimensions of the bucket and representative volumes on top of the bucket.

1.2 The method employs the technique of dividing the complex shape of the material in the bucket into simple geometric forms.

NOTE — These volumes of different bucket configurations may be calculated by the use of any combination of analytical, graphical or measuring techniques.

1.3 The rating method is intended to provide a consistent means of comparing bucket capacities. It is not intended to define actual capacities that might be observed in any specific application.

1.4 This International Standard applies to buckets for hoe type excavators and excludes buckets for cable operated excavators.

2 References

ISO 7135, *Earth-moving machinery — Hydraulic excavator — Terminology.*

ISO 7546, *Earth-moving machinery — Volumetric ratings of loader and front loading excavator buckets.* [1)]

3 Restrictions and limitations

3.1 The effect on volumes of local discontinuities such as bucket teeth, tooth adapters, extensions of side sheets, extensions of back sheets or cutting edges, chamfers, holes or gussets shall be ignored.

3.2 The bucket volume shall be positioned so that the plane defined by the top of the cutting edge and top of the back sheet is horizontal.

4 Definitions and symbols

4.1 bucket component : See figure 2 and ISO 7135 and 7546.

4.2 The X dimension in figures 3 and 4 is the dimension of the bucket opening between the cutting edge and the back sheet. The Y dimension is the vertical distance between the tip of the cutting edge and the depth of the contour of the side sheet.

4.3 strike plane : A horizontal plane across the width of the bucket from the cutting edge to the back sheet. (See figure 3.) The strike plane is used when the ratio of X/Y is 12 or greater.

4.4 strike surface : The cylindrical contour defined by lines lying across upper edges of the side sheets and parallel to the cutting edge shown in figure 4. The strike surface is used when the ratio of X/Y is less than 12.

4.5 W is the average value of the interior width and is shown in figures 3 and 4 at approximately 2/3 the height for a tapered bucket.

4.6 struck volume, V_S **:** The volume which lies beneath the strike plane in figure 3 and the strike surface in figure 4.

4.7 top volume, V_T **:** The volume at a 1:1 slope which lies on top of the strike plane in figure 5 and the strike surface in figure 6.

4.8 rated bucket volume, V_R **:** Rated bucket capacity. This capacity is calculated by adding the struck and top volumes :

$$V_R = V_S + V_T$$

5 Volumetric ratings of hoe type buckets

5.1 Boundaries of struck volume, V_S**, when** X/Y **is 12 or greater** (see figure 3).

5.1.1 The points of intersection of the cutting edge and the side sheets.

1) At present at the stage of draft.

5.1.2 The points of intersection of the top edge of the side sheets and the interior surface of the back sheet.

5.1.3 The interior surface (and/or projections) of the side sheets.

5.1.4 The interior surface (and/or projections) of the bottom and back sheets that follow the contour of the bottom edges of the side sheets.

5.1.5 The strike plane passes through a line at the top of the cutting edge in the front and a parallel line formed by the top of the back sheet at the rear.

5.2 Boundaries of the struck volume, V_S, when X/Y is less than 12 (see figure 4).

5.2.1 The points of intersection of the cutting edge and the side sheets.

5.2.2 The points of intersection of the top edges of the side sheets and the interior surface of the back sheet.

5.2.3 The interior surface (and/or projection) of the side sheets.

5.2.4 The interior surface (and/or projections) of the bottom and back sheets that follow the contour of the bottom edges of the side sheets.

5.2.5 The strike surface is defined by lines lying across the upper edges of the side sheets and parallel to cutting edge line.

5.3 Boundaries of the top (heaped) volume, V_T

5.3.1 The volume of 1:1 slope of material that can be held on the strike plane of the struck volume in figure 3 is shown in figure 5.

5.3.2 The volume of 1:1 slope of material that can be held on the strike surface of the struck volume in figure 4 is shown in figure 6.

6 Expression of volumetric ratings

6.1 The volumetric rating of a bucket, is the summation of the struck volume plus the top volume ($V_R = V_S + V_T$). It shall be expressed in cubic metres and published as the rated ISO capacity as shown in the table.

6.2 If the determined capacities as shown in Table fall below a given rating interval by more than 2 %, the next lower interval shall be the rating.

Table — Rated ISO capacity

Values in cubic metres

Range of rated capacity	Increments
Up to and including 0,2	0,01
Over 0,2 up to 0,5	0,02
Over 0,5 up to 3,0	0,1
Over 3,0 up to 5,0	0,2

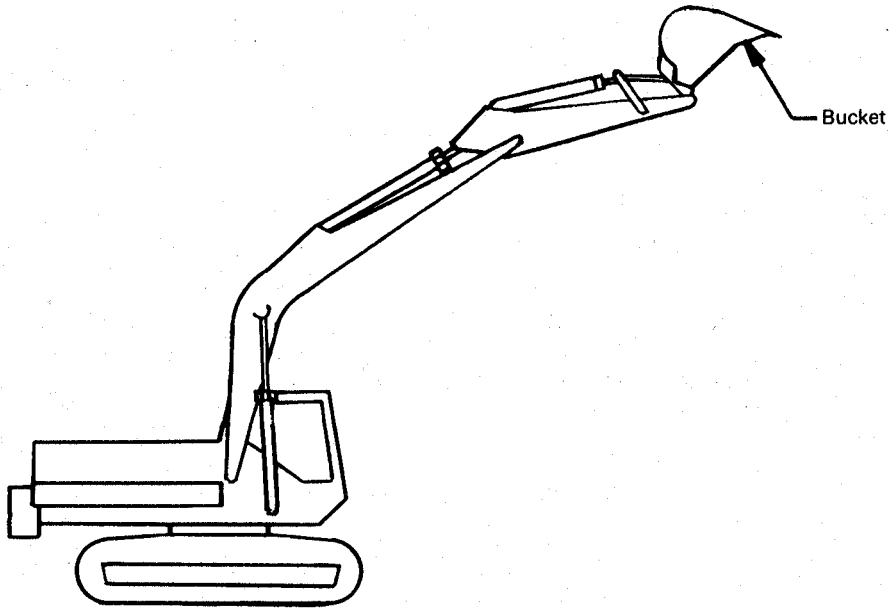

Figure 1 — Hoe type excavator

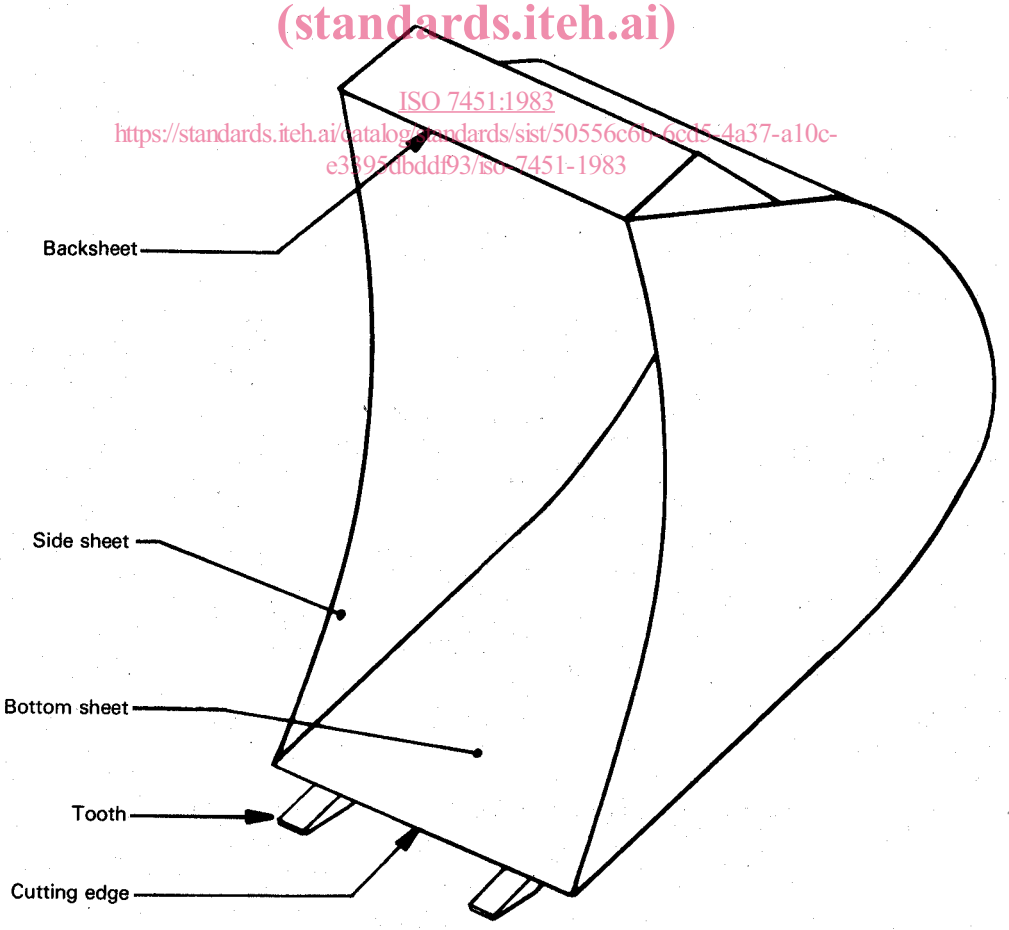

Figure 2 — Bucket — Hoe type

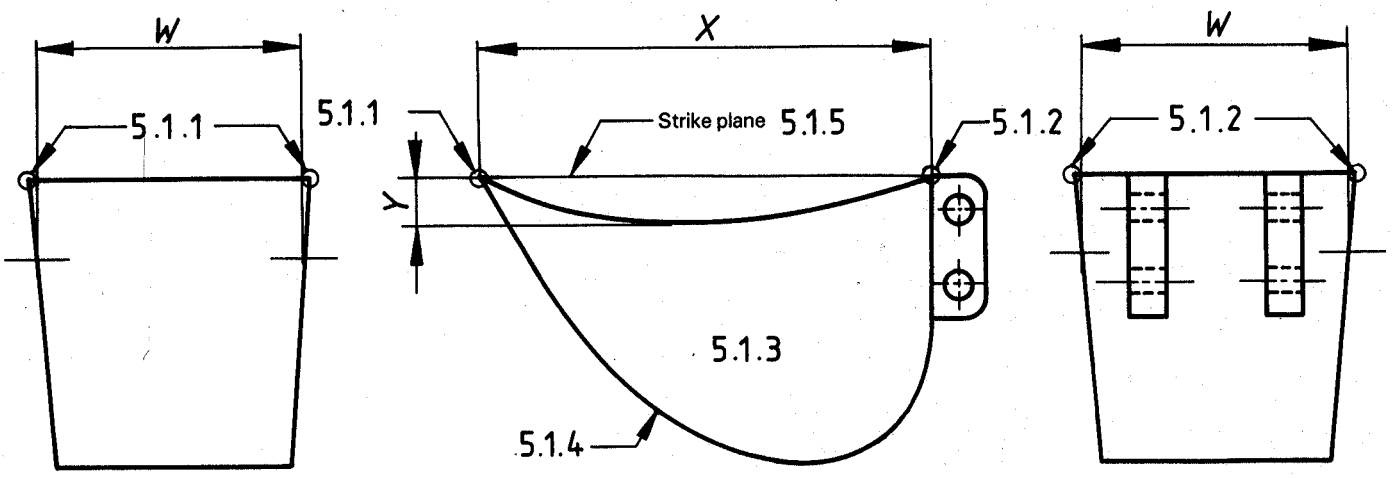

Figure 3 — Boundaries of struck volume $\left(\frac{X}{Y}\right.$ equal to or greater than 12$\left.\right)$

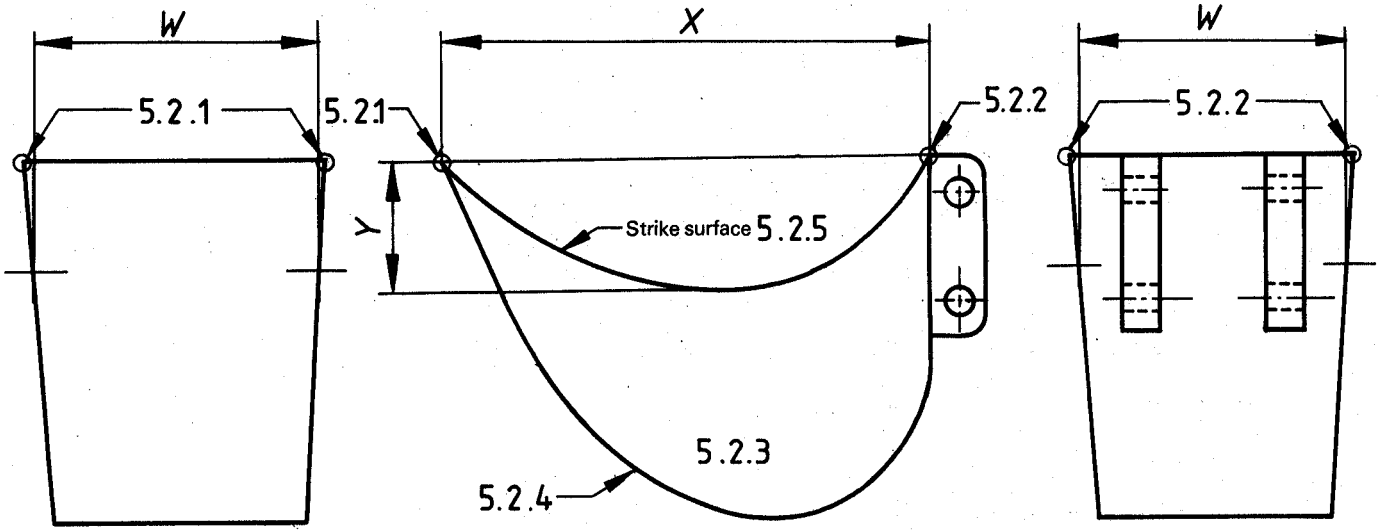

Figure 4 — Boundaries of struck volume $\left(\frac{X}{Y}\right.$ less than 12$\left.\right)$

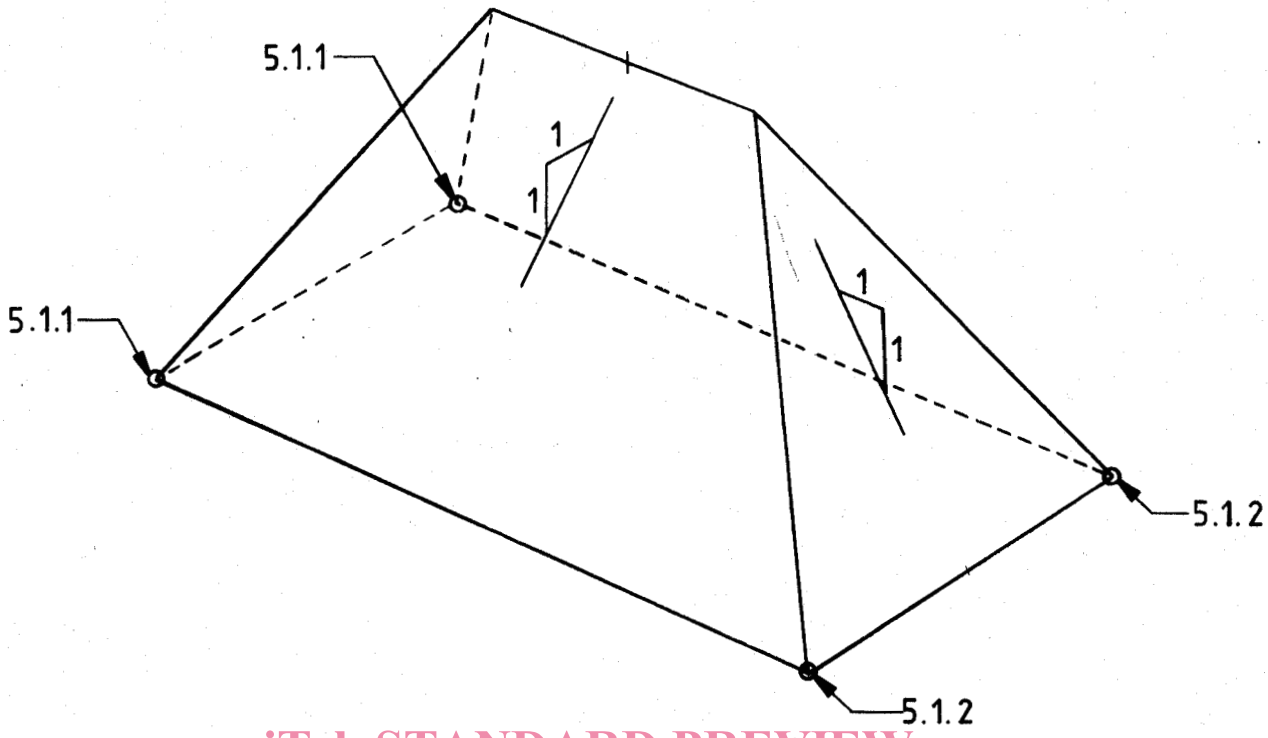

Figure 5 — Boundaries of the top (heaped) volume $\left(\frac{X}{Y}\right.$ equal to or greater than 12$\left.\right)$

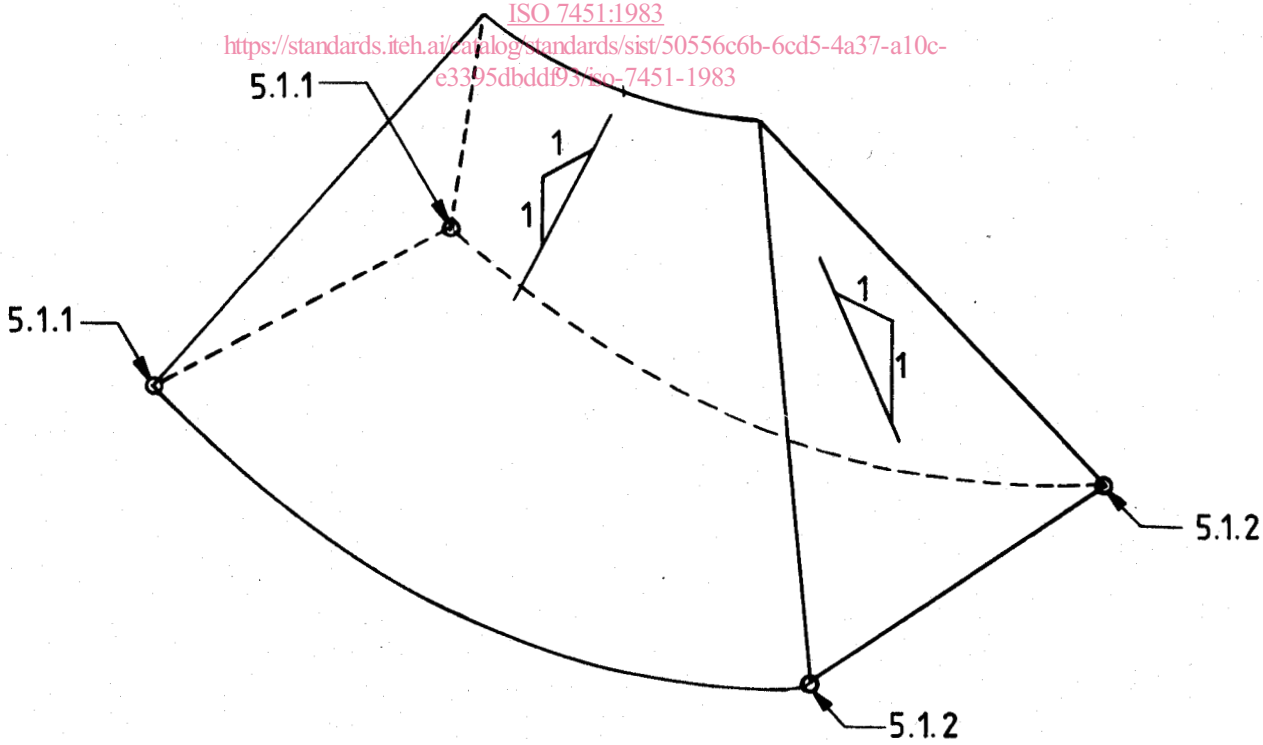

Figure 6 — Boundaries of the top (heaped) volume $\left(\frac{X}{Y}\right.$ less than 12$\left.\right)$