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# INTERNATIONAL STANDARD



# 616

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## Coke — Determination of shatter indices

*Coke — Détermination des indices de chute*

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**Descriptors** : coke, tests, impact tests, drop tests, fragmentation, grain size analysis.

## 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 616 was developed by Technical Committee ISO/TC 27, *Solid mineral fuels*.

It was submitted directly to the ISO Council, in accordance with clause 6.12.1 of the Directives for the technical work of ISO. It cancels and replaces ISO Recommendation R 616-1967, which had been approved by the member bodies of the following countries :

Australia	India	Romania
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Denmark	Portugal	Yugoslavia

The member bodies of the following countries expressed disapproval of the document on technical grounds:

France  
Germany  
South Africa, Rep. of

# Coke — Determination of shatter indices

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method of determining the strength of coke by the shatter test.

## 2 PRINCIPLE

A representative sample of the coke above a certain specified size is dropped under standard conditions, the resistance to breakage being measured by the percentage of the coke which remains on sieves of different sizes after the test, or by a mathematical expression of these values.

## 3 APPARATUS

**3.1 Shatter test apparatus** (see figure 1), mounted on a concrete base and consisting of the following parts :

### 3.1.1 Box

The box is 710 mm long, 460 mm wide and 380 mm deep. It is supported by pulleys and wire ropes so that the inside of the bottom is exactly 1 830 mm above the base plate (3.1.2) when the coke is dropped.

The bottom of the box consists of two doors, hinged lengthwise and provided with a latch for rapid opening. The doors are of 6 mm steel plate and swing open rapidly so as not to impede the fall of the coke. A suitable form of latch, which prevents movement of the box on lifting the latch, is illustrated in figure 1.

The sides of the box are made of steel plate at least 3 mm thick. Guides, fastened to the end plates of the box, engage with the main vertical side supports of the apparatus which are fastened to the side plates surrounding the base plate.

### 3.1.2 Base plate

It is essential that the base plate be rigid; a steel plate not less than 13 mm thick, 1 220 mm long and 970 mm wide is suitable. Plates at least 200 mm high and 10 mm thick are fitted on all sides to prevent loss of coke during the test.

The back plate (see note) and side plates are rigidly fixed and the front plate is removable so as to facilitate shovelling the coke from the base plate into the box after each drop; for convenience, it may be hinged and fitted with latches.

NOTE — For the purpose of describing the apparatus, it is viewed from the "front" when the counterweight appears to the right (as depicted in figure 1).

Rigidity of the base plate is ensured by one of the following two methods, of which the first is the simpler :

- a) The base plate is supported solidly on concrete, and the side and back plates and the vertical supports are welded to it.
- b) The base plate is suspended above the ground, and is welded or riveted to a lower framework of 75 mm × 75 mm × 10 mm angles; the side and back plates are welded or riveted to this framework and also to a vertical piece of angle-iron at each of the two back corners.

**3.1.3 Framework**, comprising the following elements :

#### 3.1.3.1 Vertical supports and box guides

The main vertical supports are fastened to the outside of the side plates of the base plate (3.1.2) and also to a top plate supporting the pulleys from which the box is suspended. The vertical supports are kept outside the base plate to facilitate shovelling the coke after each drop. If the plate is supported on a framework of angle-iron, the vertical supports should be riveted or welded to the angle-iron to increase rigidity. Guides, approximately 250 mm long, are fitted to the end plates of the box to engage with the main vertical supports.

Each vertical support may be built up in either of two ways, as follows. In one type, each vertical support consists of a T-section 150 mm wide with a 60 mm web, in which case the box guides are double to run on either side of the web of the T-section, the web of which is removed where it is fastened to the side plate of the base plate. Alternatively, the vertical support consists of two 75 mm × 75 mm angles set 13 mm apart so that a 6 mm guide plate from the box can move in the slot between the two angles.

### 3.1.3.2 Top plate and counterweights

The top plate is 150 to 200 mm wide and 6 mm thick; it supports two pulleys, from which the box is suspended by two wire ropes fastened to the box guides near the side supports, so as to interfere as little as possible with the reloading of the box after each drop (see note). A counterweight is suspended from the other ends of the two wire ropes, so that a double pulley is necessary at the right-hand end and a single pulley at the left-hand end. The counterweight consists of a fixed weight, of mass equal to that of the box, and two 12,5 kg removable weights which are slotted on to a rod which passes through the centre of the fixed weight.

NOTE — Central suspension of the box is not advised because this would interfere with the reloading operation.

### 3.1.3.3 Box stops

Stops are fitted to ensure that the inside of the bottom of the box is exactly 1 830 mm from the base plate when the box is raised and to prevent the box from falling onto the coke when the box is lowered. A convenient distance between the bottom of the box and the base plate for reloading is 460 mm.

These stops may consist of plates filling the slot between the double angles, when these are used as the main vertical support. Alternatively, when the side supports consist of T-sections, the distance piece fixing the width of the slot between the double guides may be extended vertically to form a stop with the top plate; the stop to prevent the box falling on the coke is fixed on the web of the section.

### 3.2 Sieves (see figure 2)

The sieve plates are machine-stamped from mild steel plate with parallel rows of square apertures. The sieve plates are made 500 mm (approximately) square and supplied with 19 mm hardwood sides screwed to the plates and armoured with horizontal angle plates to prevent wear (see figure 2). The dimensions of the sieves are given in table 1. For foundry cokes single apertures of a larger size may also be required.

### 3.3 Containers (see figure 3)

A suitable container of capacity 60 litres, made of 1,5 mm galvanized sheet, to hold 25 kg of shattered coke, is illustrated in figure 3. A smaller container of capacity 17 litres, made of the same material, is also illustrated in figure 3; this is suitable for holding separate single fractions in the size analysis if a good concrete floor is not available. A set of three large and three small containers is convenient. Each container should have its approximate mass marked on it, the actual mass being checked each time before use.

### 3.4 Weighing machine

A counter-platform weigher, reading to an accuracy of at least 25 g, is required. The machine should turn with a mass of 10 g even though the minimum reading is 25 g, and should be re-calibrated regularly.

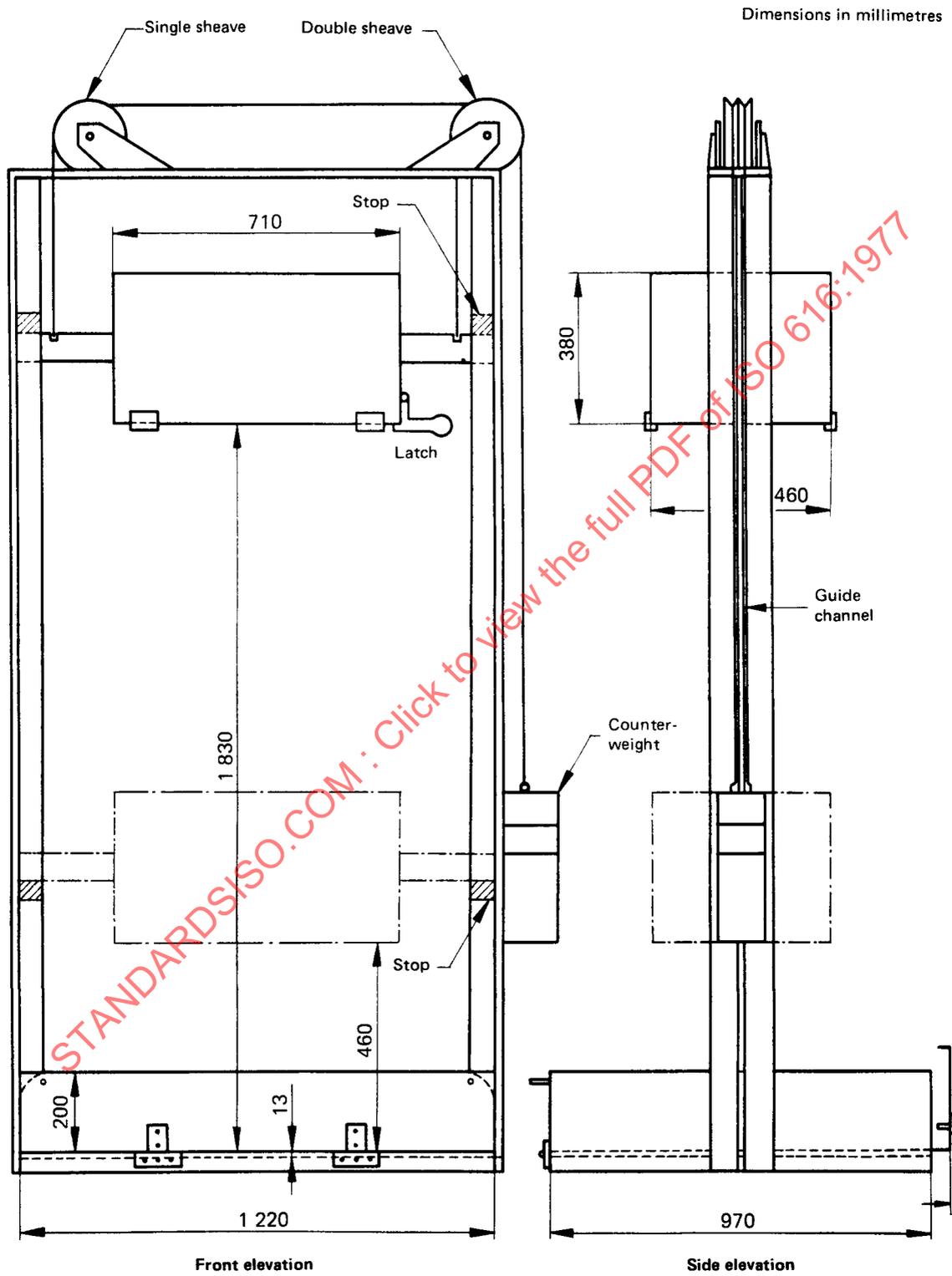


FIGURE 1 — Apparatus for determination of shatter indices

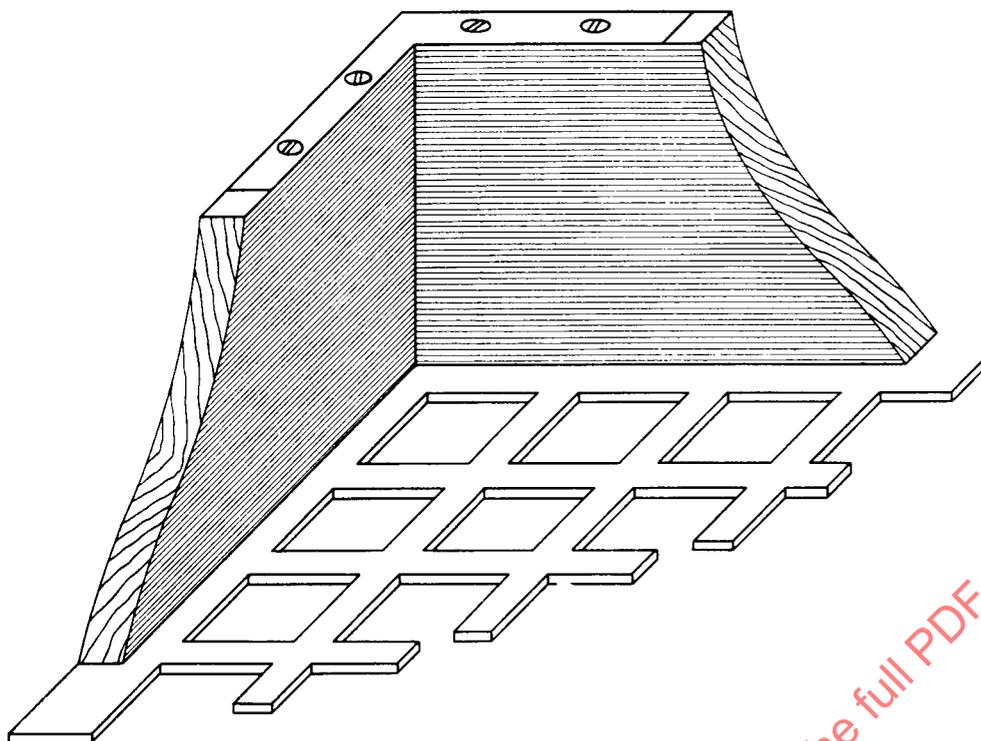


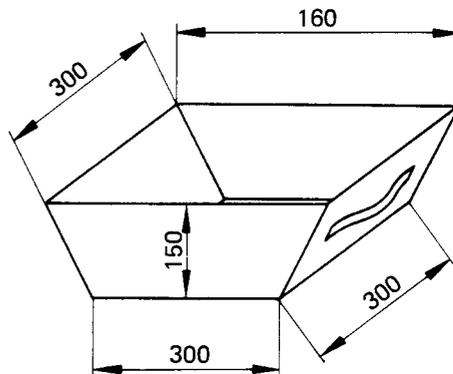
FIGURE 2 – Detail of sieve

TABLE 1 – Dimensions of sieves

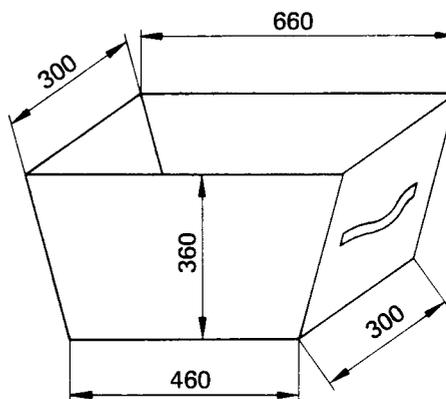
Aperture (square) <sup>1)</sup>	Preferred thickness of plate	Preferred nominal pitch	Depth of side frame
mm	mm	mm	mm
125	3	160	125
100	3	125	125
80	3	100	125
63	3	80	100
50	3	63	100
40	2	50	100
25	2	31,5	75
12,5	1,5	16	75

1) When the wear on any aperture exceeds 2 %, the aperture shall be blanked off or the test sieve changed.

Dimensions in millimetres



Capacity 17 litres



Capacity 60 litres

FIGURE 3 – Suitable containers  
Material : Galvanized sheet 1,5 mm