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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Plastics — Determination of hardness —

Part 2:
Rockwell hardness

Plastiques — Détermination de la dureté —

Partie 2: Dureté Rockwell

Reference number
ISO 2039-2: 1987 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 2039-2 was prepared by Technical Committee ISO/TC 61, *Plastics*.

This second edition cancels and replaces the first edition (ISO 2039-2: 1981), of which it constitutes a minor revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Plastics — Determination of hardness —

Part 2:
Rockwell hardness

1 Scope and field of application

1.1 This part of ISO 2039 specifies a method for determining the indentation hardness of plastics by means of the Rockwell hardness tester using the Rockwell M, L and R hardness scales.

1.2 A Rockwell hardness number is directly related to the indentation hardness of a plastic material; the higher the Rockwell hardness number, the harder the material. Due to a short overlap of Rockwell hardness scales by this procedure, two different Rockwell hardness numbers of different scales may be obtained on the same material, both of which may be technically correct.

1.3 For materials having high creep and recovery, the time-factors involved in application of the major and minor loads have a considerable effect on the results of the measurements.

1.4 An alternative method of using the apparatus to give hardness on the Rockwell-α hardness scale is specified in the annex which shows how this scale may be related to the hardness measurement of ISO 2039-1.

2 References

ISO 48, *Rubber, vulcanized — Determination of hardness (Hardness between* 10 *and* 100 IRHD*).* [1]

ISO 291, *Plastics — Standard atmospheres for conditioning and testing.*

ISO 868, *Plastics — Determination of indentation hardness by means of a durometer (Shore hardness).*

ISO 2039-1, *Plastics — Determination of hardness — Part 1: Ball indentation method.*

3 Principle

3.1 This is a method for determining hardness in which a constant minor load is applied to a steel ball resting on the material to be tested, followed by application of a major load, and then followed by a return to the same minor load, all at specified limits for times of loading. The actual measurement is based on the total depth of penetration, minus the elastic recovery after a fixed time following removal of the major load, minus the penetration resulting from the minor load. The Rockwell hardness number is derived from the net increase in depth of impression as the load on an indentor is increased from a fixed minor load to a major load and then returned to the same minor load.

3.2 Each Rockwell hardness scale division represents 0,002 mm vertical movement of the indentor. In practice, the Rockwell hardness number is derived from the following relationship :

$$HR = 130 - e$$

where

HR is the Rockwell hardness number;

e is the depth of impression after removal of the major load, in units of 0,002 mm.

NOTE — This relationship only holds for the E, M, L and R scales.

4 Apparatus

4.1 The apparatus is a standard Rockwell hardness tester which comprises essentially

— a **rigid frame** supporting an adjustable platform fitted with a plate at least 50 mm in diameter to support the test specimen;

— an **indentor** with its associated fittings;

— a **device** for applying the appropriate loads to the indentor without impact.

4.2 The indentor comprises a polished hardened steel ball which rolls freely in its housing. The ball shall not deform during the test or show damage after a test. The diameter of the indentor depends upon the Rockwell scale in use (see 4.5).

1) At present at the stage of draft. (Revision of ISO 48 : 1979, ISO 1400 : 1975 and ISO 1818 : 1975.)