



ISO 14577-1

Metallic materials — Instrumented indentation test for hardness and materials parameters —

Part 1: Test method

*Matériaux métalliques — Essai de pénétration instrumenté pour la détermination de la dureté et de paramètres des matériaux —
Partie 1: Méthode d'essai*

Third edition
2026-06

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Published in Switzerland

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This document was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 3, *Hardness testing*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 459/SC1, *Test methods for steel (other than chemical analysis)*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 14577-1:2015), which has been technically revised.

The main changes are as follows:

- Better specification of the approach speed of the tip.
- Addition of a loading method with constant strain rate.
- Change of order of hardness definitions: first H_{IT} then HM.
- Better proposals for cleaning the tip.
- Differentiation between contact area under load and in unloaded state.
- Complete reformulation of normative [Annex I](#) for radial displacement correction.

A list of all parts in the ISO 14577 series can be found on the ISO website.

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Hardness has typically been defined as the resistance of a material to permanent penetration by another harder material. The results obtained when performing Rockwell, Vickers, and Brinell tests are determined after the test force has been removed. Therefore, the effect of elastic deformation under the indenter has been ignored.

ISO 14577 (all parts) has been prepared to enable the user to evaluate the indentation of materials by considering both the force and displacement during plastic and elastic deformation. By monitoring the complete cycle of increasing and removal of the test force, hardness values equivalent to traditional hardness values can be determined. More significantly, additional properties of the material, such as its indentation modulus and elasto-plastic hardness, can also be determined. All these values can be calculated without the need to measure the indent optically. Furthermore, by a variety of techniques, the instrumented indentation test allows to record hardness and modulus depth profiles within a, probably complex, indentation cycle.

Although the indentation modulus (E_{IT}) value obtained in this test method is not directly equivalent to Young's modulus or the orientation specific elastic modulus of the material indented, E_{IT} is, however, equivalent to the isotropic Hill average of the elastic plane strain modulus of the material when there is no pile up and no residual stress.

ISO 14577 (all parts) has been written to allow a wide variety of post-test data analysis.

Part 1 of ISO 14577 specifies the method of indentation test for determination of instrumented indentation hardness and material properties.