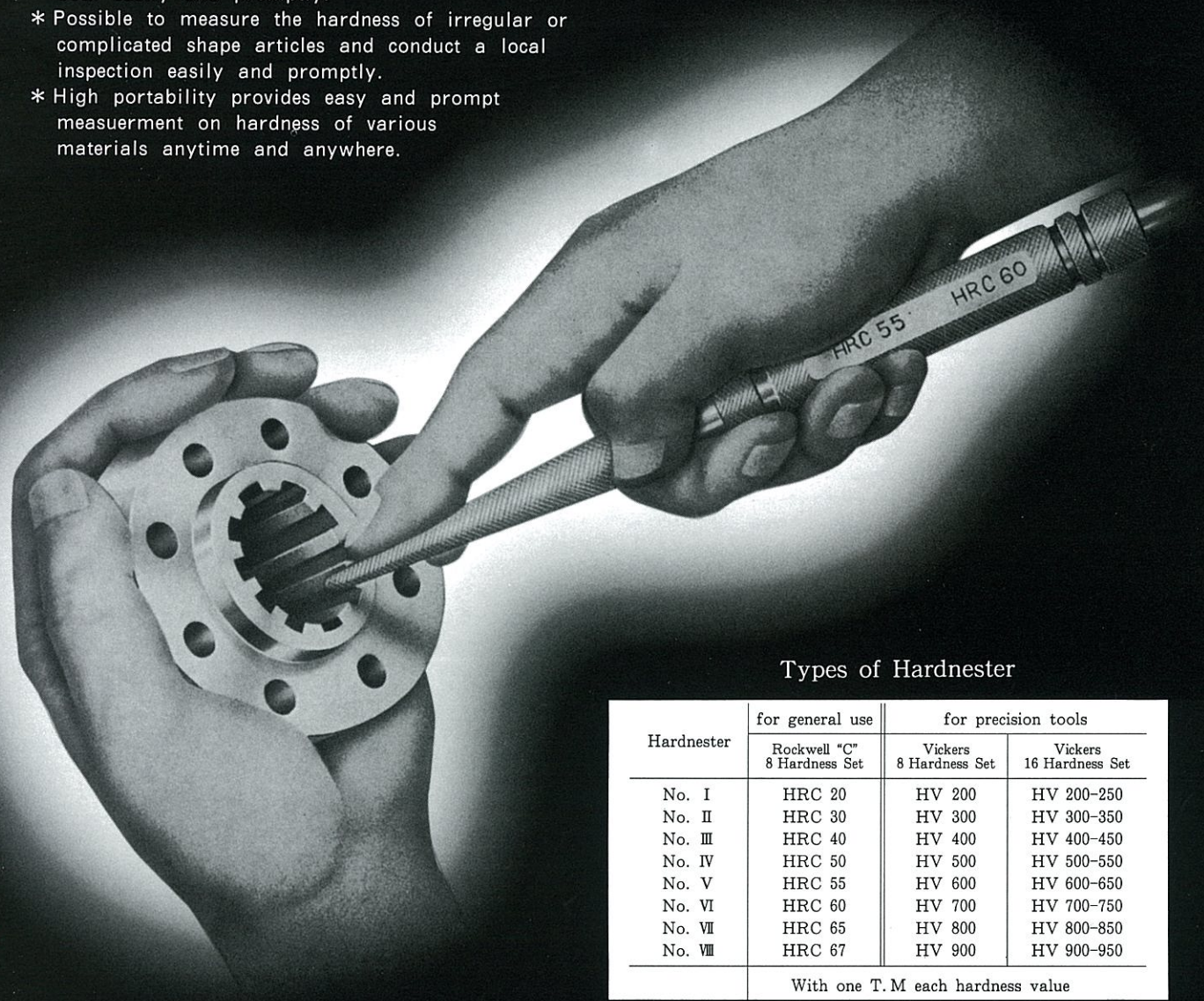
# Hardnester

## Standard File for Scratch Hardness Test

**Patent No. 196592**

We developed an epoch-making HARDNESTER, standard file for scratch hardness test and easy and prompt measurement of hardness of various kinds of metals under the leadership of the Machine Laboratory of the Agency of Industrial Science & Technology in order to meet the demand of our customers.

* Possible to measure the hardness of material as it is.
* Possible to conduct a sampling test of a large quantity of processing articles as well as an individual test both easily and promptly.
* Possible to measure the hardness of irregular or complicated shape articles and conduct a local inspection easily and promptly.
* High portability provides easy and prompt measuerment on hardness of various materials anytime and anywhere.




Types of Hardnester

| Hardnester | for general use | for precision tools | |
|---|---|---|---|
| | Rockwell "C" 8 Hardness Set | Vickers 8 Hardness Set | Vickers 16 Hardness Set |
| No. I | HRC 20 | HV 200 | HV 200-250 |
| No. II | HRC 30 | HV 300 | HV 300-350 |
| No. III | HRC 40 | HV 400 | HV 400-450 |
| No. IV | HRC 50 | HV 500 | HV 500-550 |
| No. V | HRC 55 | HV 600 | HV 600-650 |
| No. VI | HRC 60 | HV 700 | HV 700-750 |
| No. VII | HRC 65 | HV 800 | HV 800-850 |
| No. VIII | HRC 67 | HV 900 | HV 900-950 |
| | With one T. M each hardness value | | |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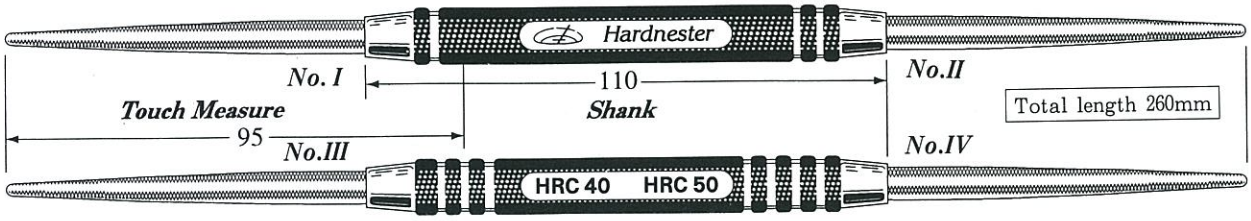



(For precise measurement : As for HV indication, the aforementioned dimensions × ½ )

## FEATURES

It is well known that hardness testers of Shore, Brinell, Rockwell and Vickers are used widely for measurement of hardness of various metal materials. They are obliged very often to know the rough hardness of articles on the site and find it very inconvenient for the reasons mentioned hereunder.

(1) The number or articles is too many, and much labour and time are needed for measurement on hardness of each article.
(2) Irregular or complicated shape of articles prevents measurement on hardness by the tester which has been designed and manufactured for plane measurement on hardness of article.
(3) When they wish to measure the hardness of local point of an article, they find it impossible to apply it to the tester for the reason of shape.

In such cases, the hardnester will be very useful and provide easy and prompt measurement of hardness of articles.
It is a scientific tool for measurement of rough hardness of articles easily and promptly anytime and anywhere.

## CONSTITUTION OF HARDNESTER

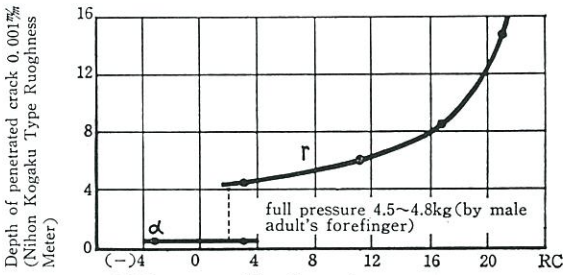
The hardnester consists of the following 2 parts.

* Touch measure
* Shank

The details of the hardnester are as shown in the following sketch. Ultra-hard steel round material has been adopted for the touch measure and tapered as shown in the sketch. It has been formed to be a file fit for scratching and a specified hardness has been given to it.
Incidentally, the hardness of the touch measure is very uniform and stabilized at the temperatures both above and below the normal temperature. Unstable composition causing the fluctuation in hardness has been removed completely from it, resulting in assuring users of extremely stable hardness. The base of the touch measure is threaded over 20*mm* and hardness index is stamped on the plane 15*mm* from the thread.
As indicated in the cover, touch measures with odd and even hardness numbers are screwed in the both ends of the shank.
And the shank bears criterion hardness of the hardnester. As shown in the above figure, symbolized bands of clock figures ··· ··· I for fine line and V for bold line ····· are combined and indicated at both ends of knurling tool so that users may know the hardnester number at first sight. As explained on thecover 3 different kinds of hardnesters are available i, e. for Shore, Rockwell, and Vickers (precise measurement). Each hardnester has 8 steps of hardness ranging from No. I to No. VIII and 4 or 8 hardnesters oi each kind are contained in a box. A certificate for hardness of hardnester has been attached to each box.

## PRINCIPLE AND USE OF HARDNESTER

When the hardnester is pressed against the object article with forefinger (4.5～4.8 kg in the case of male adult), it slips and does not penetrate in it so far as the hardness of the hardnester is lower than the object article to be measured as shown in the following figure. However, when the hardness of hardnester is slightly higher than the object article to be measured, it will start penetrating in it rapidly.
The above relations are clearly known as the position of the forefinger goes near to the touch point of the touch measure and the article.




Difference of hardness between hardnester and the object article to be measured.

If the ineffectiveness of penetration is $\alpha$ and effectiveness of penetration, $\gamma$, the transition of $\alpha-\gamma$ is not in the straight line passing through the difference of hardness 0 but intermittent.
We have found that there is a critical limit in hardness touching of hardnester.
The existence of critical hardness of the hardnester is of significance and conveniency for hardness touching of hardnester.
Correct hardness from Viekers 200 to Vickers 900 (same in Rockwell and Shore hardnesses) has been provided to the hardnester in step.
For measurement on hardness of an article, some hardnesters which are expected to be almost the same in hardness as the object article to be measured must be pressed against it one after another for confirmation of the lower limit of the $\gamma$ relations, the lowest hardness of effectiveness of penetration or of the upper limit of the $\alpha$ relations, the highest hardness. And, the critical hardness is made known and judgement is made on the rough hardness of the article (point of 0 difference in hardness in the fig.).
Accordingly, users must check whether or not the hardnester penetrates in the article to be measured for confirmation of the above upper and lower limits. Judgement is made on rough hardness of the article by the hardness index stamped on the hardnester bringing forth the critical hardness.
Accordingly, the principle of the hardnester is quite different from that of the conventional method utilizing a file with a hardening hardness (usually, HR (C) 55-64) for judgement on critical hardness by feeling.
Accordingly, if hardnesters of different hardnesses are provided, it will be possible to measure every hardness of articles very easily and promptly.

**Prof. K. Honda gave his opinion on the hardnester as follows.**

Hardnester is a handy tool for measurement of rough hardness of articles on the spot easily and promptly.
It is an interesting tool and a new idea has been incorporated in it. 1949. 8. 6.