



Scratch Resistance of Organic Coatings and Self-adhesive Films

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This standard shall be used to determine the scratch resistance of organic coatings applicable to single or multiple coat systems applied onto metallic or polymeric substrates and self-adhesive films.

1.2 Applicability. Single or multiple coat systems applied onto metallic or polymeric substrates and self-adhesive films.

1.3 Remarks. Not applicable.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ISO 105-A02 ISO 6507-1

2.2 GM Standards/Specifications.

GMW3221

3 Resources

3.1 Facilities.

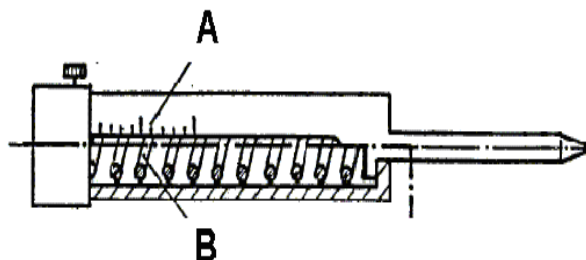
3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Hardness Test Rod (Method A). See Figure 1.

Figure 1: Hardness Test Rod



A Adjustment mark for spring force

B Spring

The rod may be procured from the following sources:

- Type 318 from Erichsen.de Erichsen GmbH & Co. KG, Am Iserbach 14, D-58675 Hemer, Germany, +49 (2372) 96830

- Type PH-5810 from byk.com
BYK-Gardner GmbH, Lausitzer Straße 8, D-82538 Geretsried, Germany, +49 (8171) 3493-0, and
BYK-Gardner USA, 9104 Guilford Road, Columbia, MD, 21046 USA, +1 (301) 483-6500
- Type HPS from www.mtv-messtechnik.de
Mtv Messtechnik oHG, Justus-von-Liebig-Straße 17a, D-50374 Erftstadt, Germany + 49 (2235) 98717-0

3.2.2 Five Finger Test Device (Method B). The basic testing device has a base and five movable fingers with metal tips. One end of each finger is fixed and the other end is fitted with interchangeable scratch steel tips with (1.0 ± 0.1) mm diameter hemisphere. The tips are loaded with different weights exerting the standard forces.

The following details apply only for Rockwood 5-Finger Scratch and Mar Testers:

Table 1: Standard Forces

Arm No.	Tip Load in N
1	20.0
2	15.0
3	13.0
4	8.0
5	5.0

Non-standard forces may be employed at the discretion of the appropriate material standard or test engineer. Weight can be loaded onto the finger in three different positions as desired as shown in Figure 2 and described in Table 2.

Test plaques rest below the loaded finger tips on a base. Actuation of the arms may be accomplished by a pneumatically driven finger.

Figure 2: Weight Placement on Arm

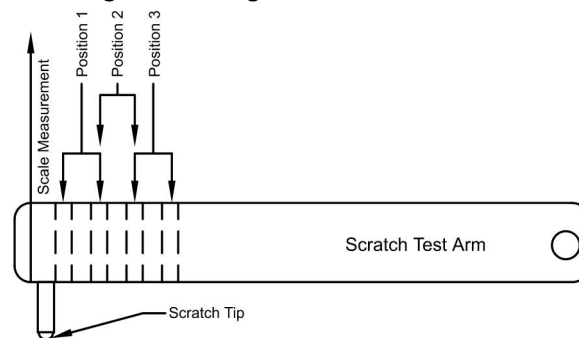


Table 2: Force/Mass Chart

Force Needed in N	Mass Identification	Position of Mass on Arm
0.6	0	0
2	A	1
3	B	2
4.5	C	3
5	C	2

Force Needed in N	Mass Identification	Position of Mass on Arm
6	D	3
7	D	1
8	E	3
9.25	E	2
10	E	1
13	F	3
14	F	2
15	F	1
17.3	G	3
18	G	2
20	G	1

The testing device may be procured from the following source:

- Rockwood Systems and Equipment, Inc.
34303 Industrial Road
Livonia, MI 48150 USA
+1 (734) 525-9140
- TABER® Industries
Materials Test & Measurement Division
455 Bryant Street
North Tonawanda, New York 14120 - USA
+1 (716) 694-4000

Replacement tips can be procured from

- LAM Industries
12985 Wayne Road
Livonia, MI 48150 USA
+1 (734) 266-1404
e-mail: Lamind@sbcglobal.net

3.2.3 Linear Hardness Test Device (Method C). The testing device is intended to establish the ability of a surface to resist damage by scratching.

The required force can be set in the range of (0.5 to 20) N by moving the weight along the reciprocating beam making use of a setting scale.

It may be procured from the following source:

Erichsen GmbH & Co. KG, Am Iserbach 14, D-58675 Hemer, Germany, +49 (2372) 96830

3.2.4 Test Tips. Made of polished steel or hard metal to ISO 6507-1 485 HV minimum.

3.2.4.1 Test Tip 1. Hemispheric tip: (1.0 ± 0.1) mm diameter.

3.2.4.2 Test Tip 2. See Figure 3 and Figure 4 for 0.5 mm tip with special geometry.