
**Preparation of steel substrates before
application of paints and related
products — Tests for the assessment
of surface cleanliness —**

**Part 3:
Assessment of dust on steel surfaces
prepared for painting (pressure-
sensitive tape method)**

*Préparation des subjectiles d'acier avant application de peintures
et de produits assimilés — Essais pour apprécier la propreté d'une
surface —*

*Partie 3: Évaluation de la poussière sur les surfaces d'acier préparées
pour la mise en peinture (méthode du ruban adhésif sensible à la
pression)*



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Contents		Page
Foreword		iv
Introduction		v
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Principle	1
5	Apparatus and materials	2
6	Procedure	2
7	Test report	4
Annex A (informative) Spring-loaded roller		5
Bibliography		8

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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was developed by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 12, *Preparation of steel substrates before application of paints and related products*.

This second edition cancels and replaces the first edition (ISO 8502-3:1992), which has been technically revised with the following changes:

- a) in [Clause 2](#) and [5.1](#), IEC 454-2 has been substituted with IEC 60454-2;
- b) in [Table 1](#), decimal sign has been changed to a decimal comma;
- c) [Figure A.4](#) has been added and the former Figure A.4 has been renamed [Figure A.5](#);
- d) the document has been editorially revised.

ISO 8502 consists of the following parts, under the general title *Preparation of steel substrates before application of paints and related products — Tests for the assessment of surface cleanliness*:

- *Part 2: Laboratory determination of chloride on cleaned surfaces*
- *Part 3: Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)*
- *Part 4: Guidance on the estimation of the probability of condensation prior to paint application*
- *Part 5: Measurement of chloride on steel surfaces prepared for painting (ion detection tube method)*
- *Part 6: Extraction of soluble contaminants for analysis — The Bresle method*
- *Part 9: Field method for the conductometric determination of water-soluble salts*
- *Part 11: Field method for the turbidimetric determination of water-soluble sulfate*
- *Part 12: Field method for the titrimetric determination of water-soluble ferrous ions*

Introduction

The performance of protective coatings of paint and related products applied to steel is significantly affected by the state of the steel surface immediately prior to painting. The principal factors that are known to influence this performance are as follows:

- a) presence of rust and mill scale;
- b) presence of surface contaminants, including salts, dust, oils and greases;
- c) surface profile.

The ISO 8501, ISO 8502 and ISO 8503 series of International Standards have been prepared to provide methods of assessing these factors, while the ISO 8504 series provides guidance on the preparation methods that are available for cleaning steel substrates, indicating the capabilities of each in attaining specified levels of cleanliness.

These series of International Standards do not contain recommendations for the protective coating systems to be applied to the steel surface. Neither do they contain recommendations for the surface quality requirements for specific situations even though surface quality can have a direct influence on the choice of protective coating to be applied and on its performance. Such recommendations are found in other documents such as national standards and codes of practice. It will be necessary for the users of these International Standards to ensure that the qualities specified are

- compatible and appropriate both for the environmental conditions to which the steel will be exposed and for the protective coating system to be used, and
- within the capability of the cleaning procedure specified.

The four series of International Standards referred to above deal with the following aspects of preparation of steel substrates before application of paints and related products:

- ISO 8501 on visual assessment of surface cleanliness;
- ISO 8502 on tests for the assessment of surface cleanliness;
- ISO 8503 on surface roughness characteristics of blast-cleaned steel substrates;
- ISO 8504 on surface preparation methods.

Each of these International Standards is in turn divided into separate parts.

This part of ISO 8502 describes a procedure for the assessment, using a pressure-sensitive tape method, of the quantity and the particle size of dust on steel surfaces prepared for painting.

In the painting schedule requirements of contractual documents giving details of surface preparation by blast-cleaning, it is normally specified that all surfaces shall be free from surface contamination including oil, grease, dirt, dust and water-soluble salts.

Dust on blast-cleaned steel surfaces can reduce the adhesion of subsequently applied organic coatings and, by absorbing moisture, might promote the corrosion of the blast-cleaned steel surfaces. Accumulation of dust more naturally occurs on horizontal surfaces, the interior of pipes, and in structural cavities. Special inspection should be carried out to ensure that such areas are adequately cleaned and adequately free from dust before painting.

Because of subjective factors involved in the test procedure, the test does not allow the precise determination of dust retained on blast cleaned steel surfaces. Nevertheless, when carried out by experienced operators and especially when used to compare the performance of surfaces under test with agreed standard specimens, it gives very useful information.

There are many possible variables in the conditions at sites where tests might be required to be carried out. Agreements made between interested parties, where appropriate, should include the number or frequency of tests, the test locations, and the dates and times when the tests are to be carried out.

Preparation of steel substrates before application of paints and related products — Tests for the assessment of surface cleanliness —

Part 3:

Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)

1 Scope

This part of ISO 8502 describes a method for the assessment of dust remaining on cleaned steel surfaces prepared for painting. It provides pictorial ratings for the assessment of the average quantity of dust. It also provides descriptive classes for the assessment of the average size of the dust particles.

The method described is a qualitative test useful for a steel surface, before cleaning, corresponding to rust grade A, B or C as defined in ISO 8501-1. It can be used as a “pass/fail” test or to provide a permanent record of the dust present on a surface.

NOTE The quantity ratings and size classes referred to in this part of ISO 8502 are derived from ISO 4628-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4618, *Paints and varnishes — Terms and definitions*

ISO 8501-1, *Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings*

IEC 60454-2, *Pressure-sensitive adhesive tapes for electrical purposes — Part 2: Methods of test*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4618 and the following apply.

3.1

dust

loose particulate matters present on a steel surface prepared for painting, arising from blast-cleaning or other surface preparation processes or resulting from the action of the environment

4 Principle

A pressure-sensitive adhesive tape is pressed on to the steel surface prepared for painting. The tape, with the dust adhering to it, is then removed and placed on a display board of a colour which contrasts to that of the dust, and is examined visually. The quantity of dust adhering to the tape and the dust particle size are then estimated.

5 Apparatus and materials

5.1 Adhesive tape, consisting of rolls of virtually colourless, transparent, self-adhesive, pressure-sensitive tape of width 25 mm, having an adhesion peel strength of at least 190 N/m width when measured in accordance with the 180° peel test in IEC 60454-2.

NOTE This peel test calls for a 180° peel from steel backing at a peel rate of (300 ± 30) mm/min.

5.2 Display board, of colour contrasting to that of the dust, for use as a background, e.g. of glass or black or white glazed tiles, cards or paper.

5.3 Spring-loaded roller, so designed that it is capable of applying a load of 39,2 N or 49,0 N or an intermediate load (see [Annex A](#)).

NOTE The roller is calibrated using weight pieces of mass 4 kg and 5 kg. At the 4 kg calibration point, the force exerted by the roller is 39,2 N and at the 5 kg calibration point it is 49,0 N.

5.4 Hand lens, capable of magnification $\times 10$.

6 Procedure

6.1 The method may be carried out either

- a) as a “pass/fail” test by assessing the quantity of dust present on a test surface and the average dust particle size, in comparison with specific limits, or
- b) to provide a permanent record of the dust present on a surface by mounting the tapes used to carry out the tests on tiles, cards or paper, of an appropriate contrasting colour.

6.2 This method is suitable for the assessment of dust retained, after cleaning, on a steel surface which corresponded before cleaning to rust grade A, B or C as defined in ISO 8501-1. Because of the limited elasticity of adhesive tape, it is not possible for the tape to penetrate into the deep pits present in cleaned steel that originally corresponded to rust grade D.

6.3 While a test procedure in which pressure is applied to a tape using the thumb is subjective, it is usually adequate, especially for use in situations where surfaces free from dust are required. In cases of dispute, except when rust grade C or D is involved, pressure may be applied to the back of the adhesive tape using a spring-loaded roller.

6.4 At the beginning of each series of tests, remove and discard the first three turns of tape from the roll and then remove a piece about 200 mm long.

6.5 Touching the adhesive side of the tape only at the ends, press about 150 mm of the freshly exposed tape firmly on to the surface under test. With due regard to [6.3](#), adopt one of the following alternative methods given in a) and b).

- a) Place the thumb across one end of the tape and move the thumb, while maintaining a firm pressure, at a constant speed along the tape three times in each direction, so that each stroke takes between 5 s and 6 s. Remove the tape from the test surface, place it on an appropriate display board ([5.2](#)) and cause it to adhere to the board by rubbing with the thumb.
- b) Apply the calibrated spring-loaded roller ([5.3](#)) centrally across one end of the tape and move the roller, while maintaining a downward load between 39,2 N and 49,0 N, at a constant speed along the tape three times in each direction, so that each stroke takes between 5 s and 6 s. Remove the tape from the test surface, place it on an appropriate display board ([5.2](#)) and cause it to adhere to the board by rubbing with the thumb.

6.6 Assess the quantity of dust on the tape by comparing visually an area of the tape with equivalent-sized areas of the pictorial references shown in [Figure 1](#). Record the rating corresponding to the reference that is the closest match.

The use of intermediate half-steps is permissible if required to give a more detailed report.

Report any overall discoloration as quantity rating 5, size class 1.

NOTE It is not unusual, after carrying out this test, to find that the tape displays an overall discoloration, usually reddish-brown or black, sometimes with the presence of discrete visible particles, depending on the type of abrasive used when blast cleaning. The discoloration is caused by microscopic dust from the test surface that can cause serious interference with paint adhesion.

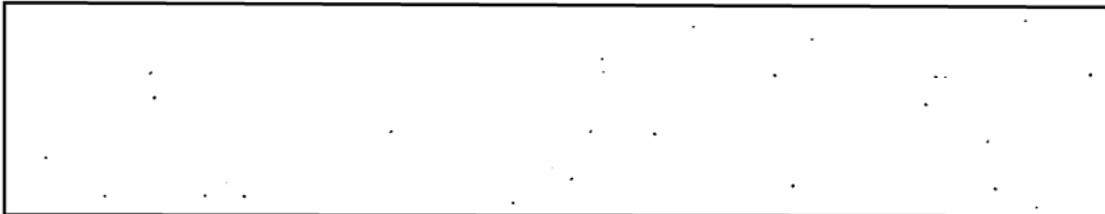
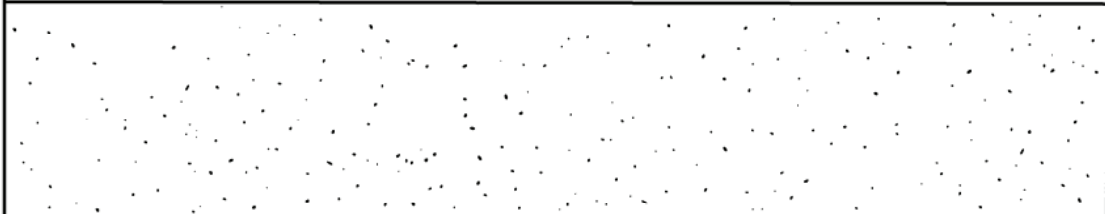
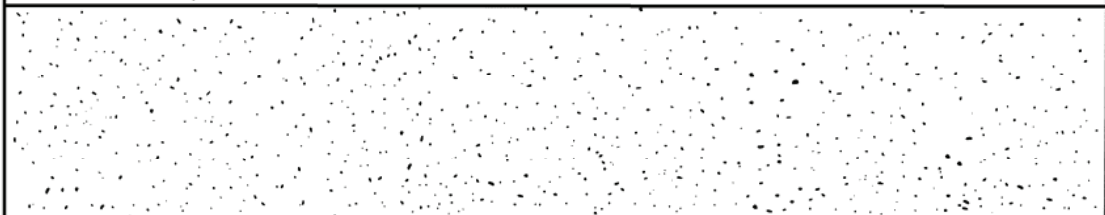
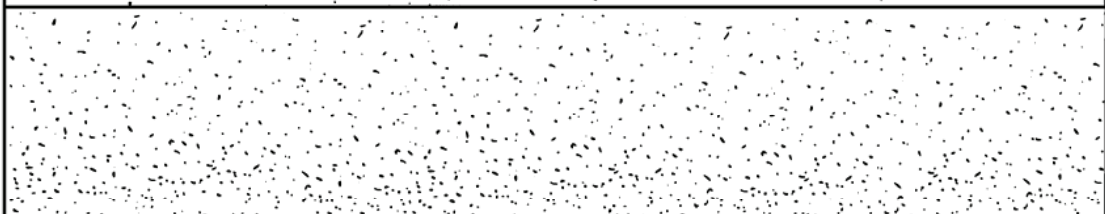
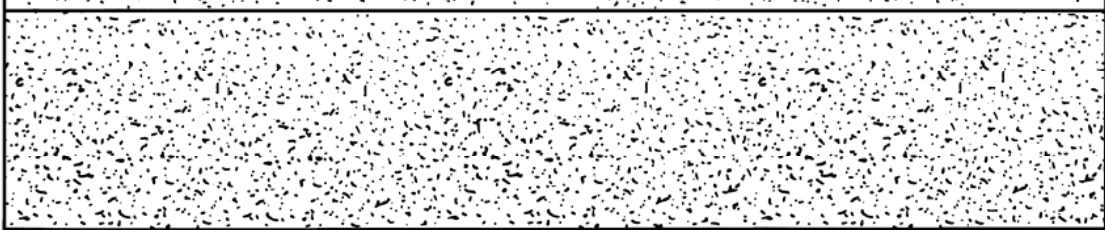
	1
	2
	3
	4
	5

Figure 1 — Pictorial references corresponding to dust quantity ratings 1, 2, 3, 4 and 5

6.7 Assess the predominating dust particle size on the adhesive tape by reference to [Table 1](#) which defines six dust particle size classes, designated 0, 1, 2, 3, 4 and 5.

The use of intermediate half-steps is permissible if required to give a more detailed report.

Report any overall discoloration as size class 1.

NOTE Microscopic dust discoloration usually consists of particles less than 50 µm in diameter.

Table 1 — Dust size classes

Class	Description of dust particles
0	Particles not visible under 10× magnification
1	Particles visible under 10× magnification but not with normal or corrected vision (usually particles less than 50 µm in diameter)
2	Particles just visible with normal or corrected vision (usually particles between 50 µm and 100 µm in diameter)
3	Particles clearly visible with normal or corrected vision (particles up to 0,5 mm in diameter)
4	Particles between 0,5 mm and 2,5 mm in diameter
5	Particles larger than 2,5 mm in diameter

6.8 Carry out a sufficient number of tests to characterize the surface under test.

For every surface of one particular type and aspect, carry out not less than three separate tests. If the results do not have a spread of one or less quantity rating, carry out at least two additional tests to establish the mean.

6.9 After completing the test and before painting the steel surface, remove any tape or adhesive left on the test surface.

7 Test report

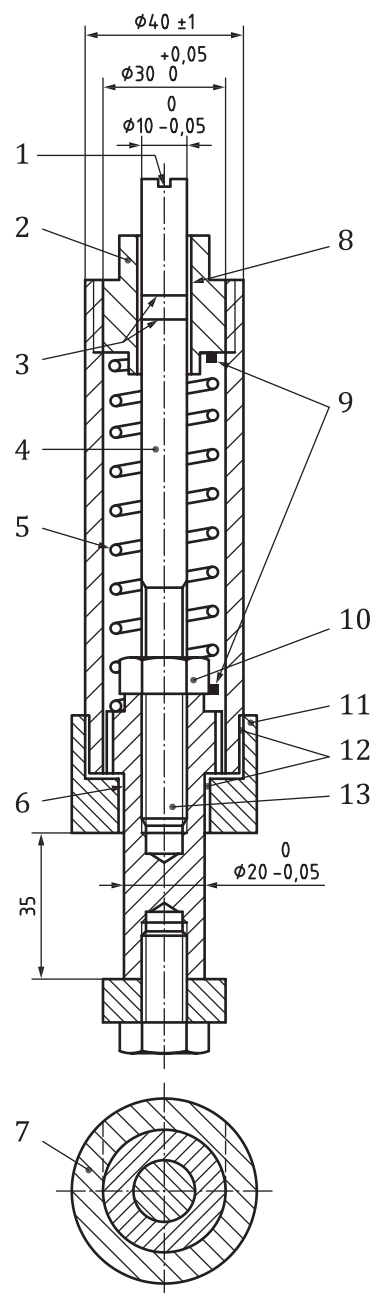
The test report shall contain at least the following information:

- a) all details necessary to identify the surface(s) tested;
- b) a reference to this part of ISO 8502, i.e. ISO 8502-3;
- c) all details necessary to identify the adhesive tape used;
- d) all details necessary to identify the substrate used as a display background for the tape;
- e) the nature of the area(s) of each surface tested, with reference to specific features, e.g. ledges, beams, web or flange faces, pockets formed from fabricated units and the attitude of the test area, e.g. vertical, horizontal upward-facing or horizontal downward-facing;
- f) the dust quantity rating(s) and dust size class(es) for each surface examined (alternatively, for general steel construction work, the test tapes themselves may, if agreed between the interested parties, be kept as a record of the tests);
- g) any deviation from the procedure described;
- h) any unusual features (anomalies) observed during the test;
- i) the date and, if applicable, the time of each test.

Annex A (informative)

Spring-loaded roller

This annex shows, by way of example only, the design of a roller that has been found suitable in use. For detailed sectional views, see [Figure A.1](#), [Figure A.2](#), [Figure A.3](#) and [Figure A.4](#).



Dimensions in millimetres

Key

- 1 notch for screwdriver blade tip
- 2 tap plug
- 3 4 kg and 5 kg graduations
- 4 rising shaft
- 5 light helical steel compression spring with the following characteristics:
 - a) nominal wire diameter 2 mm
 - b) nominal coil diameter
 - 1) internal 21 mm
 - 2) external 25 mm
 - c) closed ends, ground
 - d) total number of coils 13 (11 working coils and 2 end coils)
 - e) free length 80 mm
 - f) spring rate 3 N/mm $\pm 5\%$
- 6 sliding-fit surfaces
- 7 rubber, hardness (50 $\pm$ 5) IRHD
- 8 sliding-fit surfaces
- 9 both spring ends fixed
- 10 M10 lock-nut
- 11 knurled knob
- 12 air vent recess (sliding-fit surfaces)
- 13 threaded section on rising shaft for adjusting height of shaft (see also [Figure A.5](#))

Figure A.1 — Sectional side view of roller

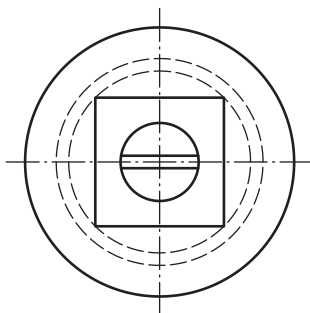
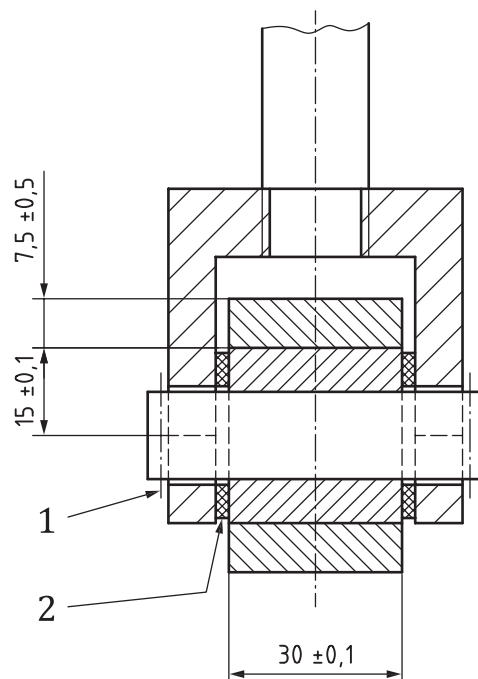


Figure A.2 — Plan view of adjustable-height shaft and top plug

Dimensions in millimetres



Key

- 1 circlip
- 2 spacer

Figure A.3 — Sectional front view of lower part of roller

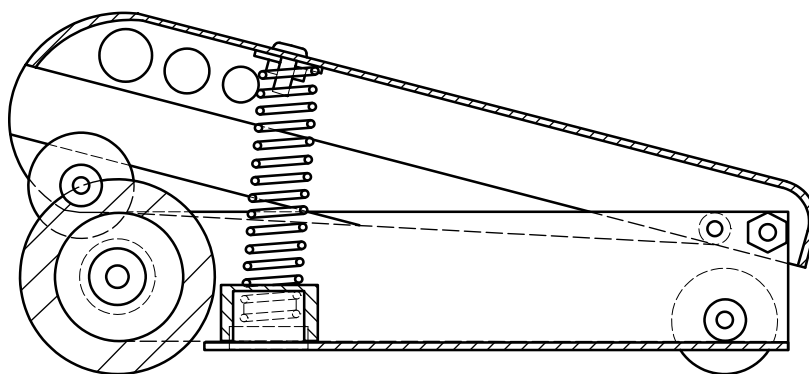
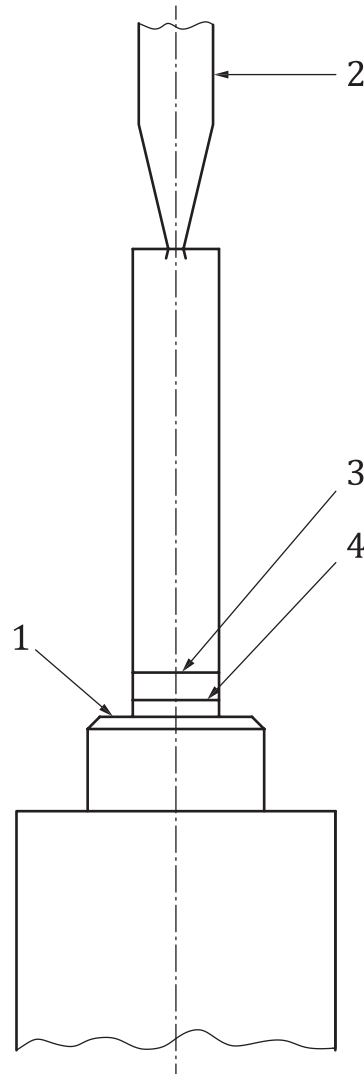


Figure A.4 — Sectional side view of roller

For calibration, see [Figure A.5](#). To set the applied roller pressure, hold the roller vertically by the casing and press the roller on to the pan of a suitable weighing scale so that the roller exerts a force equal to the weight of a 4 kg or 5 kg weightpiece, as required. Adjust the height of the rising shaft with a screwdriver so that the 4 kg or 5 kg graduation on the shaft is level with the top of the top plug. Set the position of the rising shaft by means of the lock-nut.



Key

- 1 top plug
- 2 screwdriver blade tip (for adjustment of the rising shaft)
- 3 4 kg graduation (force exerted by roller 39,2 N)
- 4 5 kg graduation (force exerted by roller 49,0 N)

Figure A.5 — Calibration at the 4 kg and 5 kg graduations

Bibliography

- [1] ISO 4628-1, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 1: General introduction and designation system*

