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**Paints and varnishes — Determination of  
wet-scrub resistance and cleanability  
of coatings**

*Peintures et vernis — Détermination de la résistance au frottement  
humide et de l'aptitude au nettoyage des revêtements*

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## Contents

Page

Foreword.....	iv
Introduction .....	v
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions.....	1
4 Principle .....	2
5 Reagents .....	2
6 Apparatus .....	2
7 Sampling.....	4
8 Procedure .....	4
9 Expression of results .....	6
10 Precision.....	7
11 Test report .....	8
Annex A (normative) Determination of the dry-film density of the coating .....	9
Bibliography .....	11

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## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 11998 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

This second edition cancels and replaces the first edition (ISO 11998:1998), which has been technically revised. The main changes are:

- the definitions for stroke length and scrub cycle have been changed and a new term scrub length has been introduced;  
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- the method for the determination of the dry-film density of the coating, specified in Annex A, has been replaced by a new method.

## Introduction

As noted in the Foreword, this International Standard is a revision of ISO 11998:1998. The use and application of the standard is now established globally, and improved procedures/equipment have been proposed. A joint CEN/ISO working group has agreed to undertake interlaboratory testing with a new type of abrasive pad (different from that specified in 6.5). It is anticipated that the results of the testing will be available by the end of 2006 and an early revision of the standard might be initiated.

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# Paints and varnishes — Determination of wet-scrub resistance and cleanability of coatings

## 1 Scope

The ability of coatings to withstand wear caused by repeated cleaning operations and to withstand penetration by soiling agents is an important consideration both from a practical point of view and when comparing and rating such coatings. This International Standard describes an accelerated method for the determination of wet-scrub resistance. With regard to the cleanability of coatings, only the method itself and not the soiling agents are specified.

**NOTE** Since these properties depend not only on the quality of a coating but also on the substrate, the method of application, the drying conditions and other factors, the results obtained are not directly transferable to actual practice. In this standard the evaluation of the coating is based on a defined substrate, a fixed application method, specified drying conditions and a defined method of wet scrubbing.

## 2 Normative references

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

ISO 1513, *Paints and varnishes — Examination and preparation of samples for testing*

ISO 3270, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1 cleanability

ability of a dry coating film to withstand penetration by soiling agents and to be freed from them through the cleaning process without removing more than a defined film thickness

### 3.2 scrub cycle

one reciprocal movement of the scrub pad over the scrub length in both directions

### 3.3 scrub length

stroke length plus the length of the pad

**3.4 stroke length**

distance traversed by one stroke of the apparatus

**3.5 wet-scrub resistance**

ability of a dry coating film to sustain less than a specified loss in film thickness, averaged over a defined area, when exposed to 200 wet-scrub cycles

**4 Principle**

**4.1 Wet-scrub resistance**

The test coating is applied to a test panel using a film applicator at the appropriate gap clearance. After drying and conditioning, the coated panel is weighed and subjected to 200 wet-scrub cycles in a scrub testing machine.

NOTE Some classification standards, e.g. EN 13300, require fewer scrub cycles.

It is then washed, dried and weighed again to determine its loss in mass, from which the mean loss in film thickness is calculated.

Through comparison of the mean loss in film thickness with a specified value, as agreed between interested parties, the coating can be rated in wet-scrub resistance classes.

**4.2 Cleanability**

For the determination of cleanability, soiling agents are applied to similarly prepared coated panels. The soiling agents specified are left in contact with the coating film for a specified time. The coated, soiled panels are then subjected to 200 wet-scrub cycles.

When the applied soiling agent is observed to be removed and the coating is wet-scrub resistant, the coating is said to be cleanable in terms of the soiling agent used.

**5 Reagents**

**5.1 Washing liquid**

Use a 2,5 g/l solution of sodium *n*-dodecylbenzenesulfonate in water conforming to the requirements of grade 3 of ISO 3696. Allow the solution to stand before use until all air-bubbles and foam have dissipated.

**5.2 Soiling agents**

The soiling agents and manner of application shall be agreed between the interested parties.

**6 Apparatus**

**6.1 Test panel**, made of PVC film free of migration-susceptible chemical plasticizers, of sufficient rigidity to ensure a flat surface, impervious to and unaffected by water or aliphatic organic solvents and of nominal thickness 0,25 mm, approximately 430 mm long and not less than 80 mm wide.

Other types of plastics film may be used where the coating contains solvent which might adversely affect the PVC film. If the coating delaminates before or during the test, another, more suitable, substrate shall be used.



**6.2 Film applicator**, preferably an automatic film applicator, used at an application speed of 10 mm/s to 15 mm/s and fitted with a doctor blade with an appropriate gap clearance and a gap width of at least 60 mm.

**6.3 Wet-scrub tester apparatus**, consisting of a reciprocating scrub testing machine with a stroke length of  $(300 \pm 10)$  mm and operating at approximately  $(37 \pm 2)$  scrub cycles per minute. A counter for recording the number of scrub cycles shall be provided.

**6.4 Scrub pad holder**, consisting of a metal plate fitted with pins to hold the abrasive pad. A mounting device with elongated holes is loosely fitted on the top of the plate (see Figure 1 and Figure 2). The mass of the scrub pad holder which exerts a downward force on the test panel shall be  $(135 \pm 1)$  g.

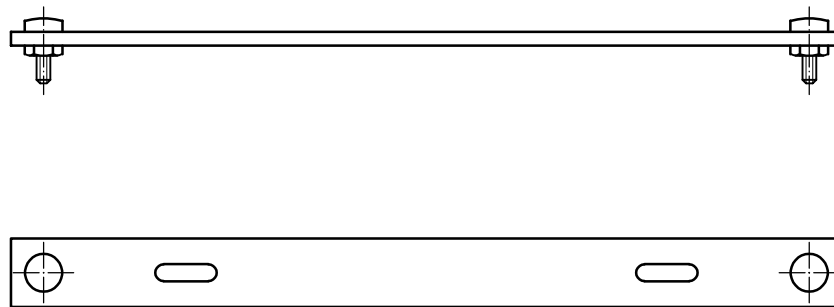
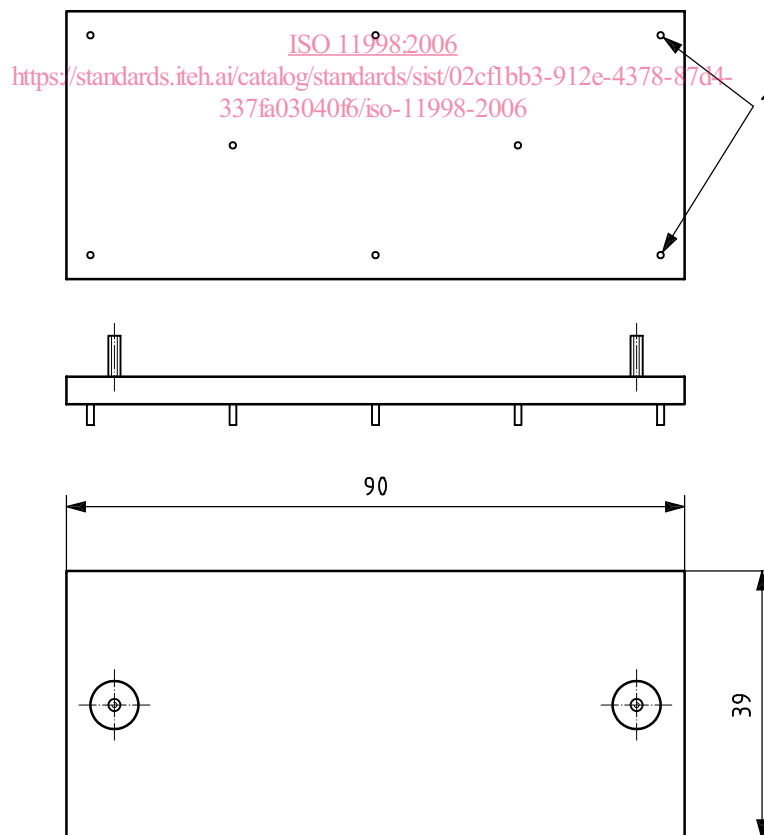


Figure 1 — Mounting device

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Dimensions in millimetres



**Key**

1 pins

Figure 2 — Scrub pad holder