UDC 667.61 : 620.1

Ref. No. : ISO/R 1514-1970 (E)

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 1514

PAINTS AND VARNISHES

STANDARD PANELS FOR TESTING

1st EDITION
July 1970

For each individual country the only valid standard is the national standard of that country.

Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 1514, *Paints and varnishes – Standard panels for testing,* was drawn up by Technical Committee ISO/TC 35, *Paints and varnishes,* the Secretariat of which is held by the Nederlands Normalisatie-instituut (NNI).

Work on this question led to the adoption of Draft ISO Recommendation No. 1514 which was circulated to all the ISO Member Bodies for enquiry in November 1968. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Ireland	Spain
Austria	Israel	Sweden
Denmark	Italy	Switzerland
France	Netherlands	Turkey
Germany	Peru	U.A.R.
Greece	Poland	United Kingdom
India	Portugal	U.S.S.R.
Iran	South Africa, Rep. of	

No Member Body opposed the approval of the Draft.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

ISO Recommendation R 1514 July 1970

PAINTS AND VARNISHES

STANDARD PANELS FOR TESTING

INTRODUCTION

This ISO Recommendation is one of a series dealing with the sampling and testing of paints, varnishes and related products. For many of the most widely used test methods, the type of panel used and the particular way in which it is prepared for use, affects the test results to a significant degree. Consequently it is important to standardize as carefully as possible both the panels and the preparation procedure employed for these tests. It is equally desirable to reduce to a minimum the number of different "standard panels" required for use in a paint testing laboratory.

It is not possible to include in an ISO Recommendation all the types of panel and preparation needed for paint testing, and in selecting those described in this document a distinction has been drawn between three different requirements, as follows :

The *first requirement* arises when the paint, varnish or other product is being tested in relation to a particular industrial application. This is most conveniently done on a panel or substrate that corresponds closely (regarding material, cleaning procedure and subsequent surface preparation such as grit-blasting or chemical pretreatment) to the actual industrial application involved. In such instances the only guidance that need be given regarding the panel is to state

(*a*) that the parties involved should reach agreement beforehand on the details of the materials and procedures to be used in preparing the substrate;

(*b*) that these should be stated in the test report.

The *second requirement* arises when the test method requires for its performance a specially prepared test panel specific to that test; for example, an optically flat panel may be required for a gloss comparison test. In such instances, a detailed specification for both the panel and the preparation procedure should be given in the description of the test method concerned.

The *third requirement* arises when neither of the above apply. In such cases the product needs to be tested on an agreed surface which is capable of good reproducibility. It is desirable to use a material which is generally available in standard quality and which can be conveniently cleaned or otherwise prepared so as to provide a standard surface. The fact that this may not necessarily be the type of surface on which the product will be applied in practice, is of less significance.

This ISO Recommendation is concerned with the third requirement. It lays down preparation procedures that are known to be reproducible and gives additional guidance in instances where there may still be doubt because of lack of international uniformity of procedure.

1. SCOPE

1.1 This ISO Recommendation describes procedures for the preparation, prior to painting, of standard panels for use in *general* methods of test for paints, varnishes and related products.

1.2 The following types of standard panels are described :

(*a*) Steel panels prepared by
- solvent cleaning,
- abrasion (burnishing),
- blast-cleaning (notes for guidance only).

(*b*) Tinplate panels prepared by
- solvent cleaning,
- abrasion (burnishing).

(*c*) Aluminium panels prepared by
- solvent cleaning,
- abrasion (burnishing),
- acid chromating.

(*d*) Glass panels prepared by
- solvent cleaning,
- detergent cleaning.

2. STEEL PANELS

2.1 Material

Steel panels intended for *general* testing (in contrast to those required for testing to particular applications and uses) should be of rust-free flattened mild steel in sheet or strip form, the thickness and other dimensions of the panel being as specified in the description of the test method or otherwise agreed.

Unless otherwise agreed, the steel should be a fully killed cold reduced type having a grain size not greater than 0.030 mm and an Erichsen cupping value equivalent to not less than 10 mm on a sheet thickness of 0.8 mm (see Appendix Y). The panels should show a minimum of surface roughness and discolouration, and as a guide it is recommended that the surface roughness of steel as received (as defined in ISO Recommendation R 468, *Surface roughness*) should not exceed 1.5 μm.

2.2 Storage

The panels should be adequately protected from rusting before use, by storage in a light neutral mineral oil or hydrocarbon solvent*; for example they may be totally immersed in or coated with this oil and then wrapped individually in paper impregnated with oil.

* The oil or hydrocarbon solvent should be free from additives.

2.3 Preparation by solvent cleaning

Wipe the panel free from excess oil and wash it thoroughly with xylene or mineral solvent to remove all traces of oil; other solvents which evaporate more quickly may be used provided toxic hazards are avoided.

Various washing procedures are permitted provided they are neither acid nor alkaline. It is essential to ensure that any small fibres arising from cleaning cloths are removed in the cleaning process. The surface of the panel must not be touched by hand or otherwise contaminated after cleaning. Allow the clean panel to dry either by evaporation of the washing solvent or by lightly wiping with a clean linen cloth, if necessary warming very slightly to remove traces of condensed moisture. If the paint coating cannot be applied immediately, the clean panels should be stored in a desiccator until required.

Where a large number of panels is being prepared it is prudent to check every 20th panel for cleanness. One suggested method of checking is to dip this one panel momentarily into pure distilled water. The cleaning process is considered satisfactory if the panel on withdrawal shows a nearly continuous film of distilled water on its surface. If the panel does not show a satisfactory result on the test the entire cleaning process should be repeated on all the panels. In any case the panel tested must be recleaned before use.

2.4 Preparation by abrasion (burnishing)

The burnishing operation is a method of abrading the surface with abrasive paper to remove unevenness and surface contamination that cannot be removed by solvent cleaning, both these defects being liable to influence the uniformity of test results. To ensure complete removal of surface contaminants the original surface should be completely removed as determined by visual inspection. The amount of surface to be removed depends on the initial surface profile but in any case should be not less than 0.7 μm, which may conveniently be determined by the loss in mass of the panel (a thickness of 0.7 μm is approximately equivalent to a mass of 5 to 6 g/m^2).

Unless otherwise agreed, the burnishing operation should be carried out by dry rubbing using a good quality silicon carbide paper with an abrasive grain size corresponding to that known as 220 silicon carbide grit.*

NOTE. – Subject to prior agreement, mineral solvent complying with ISO Recommendation R 1250 , *Mineral solvents for paints (white spirits and related hydrocarbon solvents)*, may be used as a lubricant in the burnishing operation.

The panels should be burnished uniformly either by hand or mechanically, a suitable sequence of operations being as follows :

(1) straight across the panel in a direction parallel to any one side;

(2) at right angles to the first direction until all signs of the original burnishing have been removed;

(3) with a circular motion of diameter approximately 8 to 10 cm, until a pattern has been produced consisting only of circular burnishing marks superimposed one upon another.

Where mechanical burnishing is used the operation (3) above is essential. The burnishing operation is considered complete when no sign is visible of the original surface or its undulations.

The burnished panels should be cleaned thoroughly before use according to the procedure described in clause 2.3, to ensure that all loose grit, steel particles and other contaminants are removed. Care should be taken to ensure that the surface of the finally cleaned panel is not touched by hand or otherwise contaminated. If the paint coating cannot be applied immediately, the cleaned panels should be stored for a few days only in a desiccator until required.

2.5 Preparation by blast-cleaning

Where it is required to carry out tests on panels of blast-cleaned structural steel, the guidance given in Appendix Z should be followed, unless otherwise agreed. It is emphasized, however, that this preparation by blast-cleaning is not intended for cold-rolled steel panels such as are recommended in clause 2.1 for general testing purposes.

* According to the information at present available, this is a grade of silicon carbide grit standardized through the Federation of European Producers of Abrasive Products (FEPA).

3. TINPLATE PANELS

3.1 Material

The panel should be of tinplate made by the cold reduction process and coated with tin by a suitable process. The steel substance should have a nominal thickness of 0.3 mm and the tin coating should be equivalent to a weight of 24.0 g/m^2.

3.2 Preparation by solvent cleaning

It is not necessary for tinplate panels to be specially protected in storage before use in the same way as steel panels (see clause 2.2); nevertheless the surface of the panels may be contaminated with lubricants during processing. It is therefore recommended that the panels should be cleaned before use by the procedure described in clause 2.3 for steel panels.

3.3 Preparation by abrasion (burnishing)

Burnished tinplate panels are recommended where a more uniform test surface is required than is produced by solvent cleaning. The burnishing operation should be carried out as for steel panels (see clause 2.4) except that it should be done much more lightly to avoid embedding abrasive in the surface and completely removing the tin coating in some places. It is therefore recommended to use a good quality fine silicon carbide paper, for example one with an abrasive grain size corresponding to 320 silicon carbide grit.

The burnishing operation should be continued until the whole of the surface of the panel is covered by a pattern of circular burnishing marks superimposed one upon another and the original surface pattern is no longer visible to the naked eye.

The burnished panels should be cleaned thoroughly before use according to the procedure described in clause 2.3, to ensure that all loose grit, tin particles and other contaminants are removed. Care should be taken to ensure that the surface of the finally cleaned panel is not touched by hand or otherwise contaminated. If the paint coating cannot be applied immediately, the cleaned panels should be stored for a few days only in a desiccator until required.

4. ALUMINIUM PANELS

4.1 Material

Aluminium panels intended for *general* testing (in contrast to aluminium, or aluminium alloy, panels required for testing to particular applications and uses) should be of sheet or strip complying with the chemical composition for Grade Al 99.0 in ISO Recommendation R 209, *Composition of wrought products of aluminium and aluminium alloys*. Either soft (annealed) or hard material should be used, as specified for the particular test method. The hard aluminium should have a tensile strength of at least 138 N/mm^2 and the soft aluminium a tensile strength not greater than 108 N/mm^2. The thickness and other dimensions of the panel should be as specified in the test method or otherwise agreed. The sheet and strip should not show any cracks when a test piece of the metal 20 mm wide and of convenient length, cut with the longer axis transverse to the direction of rolling and with the longer edges carefully rounded and smoothed longitudinally, is bent through 180° flat upon itself in the case of soft aluminium, or through 180° on a cylindrical former of radius equal to the thickness of the sheet in the case of hard aluminium.

4.2 Preparation by solvent cleaning

Where clean panels are required without further preparation, the cleaning procedure used should be that described in clause 2.3 for steel panels.

4.3 Preparation by abrasion (burnishing)

Where burnished panels are required, the procedure should be essentially as described in clause 2.4 for steel panels, except that the abrasive used should be calcined alumina conforming to the following specification :

particles greater than	63 μm	:	10 % maximum
particles less than	20 μm	:	70 % minimum
particles less than	10 μm	:	60 % minimum

The sequence of burnishing operations should be as described in clause 2.4, but the abrasive should be wetted with mineral solvent for paint (white spirit) and applied to the panel surface on a pad of soft cloth or other suitable material.

The burnishing operation should be continued until the whole of the surface of the panel is covered by a pattern of circular burnishing marks superimposed one upon another and the original surface pattern is no longer visible to the naked eye.

The burnished panels should be cleaned thoroughly before use according to the procedure described in clause 2.3, to ensure that all loose grit, aluminium particles and other contaminants are removed. Care should be taken to ensure that the surface of the finally cleaned panel is not touched by hand or otherwise contaminated. Aluminium panels should only be prepared immediately prior to painting because if stored an oxide film is liable to form on the surface.

4.4 Preparation by acid chromating

Where aluminium panels are prepared by acid chromating for *general* testing (in contrast to those required for testing to particular applications and uses) it is recommended that the following procedure should be used.

Clean the panels as in clause 4.2 and immerse them for 20 minutes at 55 ± 5 °C in an acid chromate solution contained in a glass or polyethylene vessel. The solution should be prepared as follows :

> Dissolve 100 g of analytical reagent quality potassium or sodium dichromate in 1000 ml of distilled water and add slowly while stirring 170 ml of analytical reagent quality sulphuric acid ($d = 1.84$).
>
> (*Safety warning :* when preparing and using acid chromate solutions the operator should wear safety goggles and rubber gloves).

Remove the panels from the solution and wash them thoroughly and as rapidly as possible in cold and then hot distilled water (or demineralised water of specific resistance of at least 10^5 ohm·cm). Allow the panels to dry and then coat them as soon as possible with the paint. Care should be taken to ensure that the prepared surface is not touched by hand or otherwise contaminated before painting.

NOTE. – The chromate solution will become exhausted with use and should be renewed when necessary.

5. GLASS PANELS

5.1 Material

The panels should be of polished plate glass. The thickness and other dimensions of the panels should be described in the test method or otherwise agreed.

5.2 Preparation by solvent cleaning

The panels should be cleaned by the procedure described in clause 2.3 for steel panels.

5.3 Preparation by detergent cleaning

The panels should be washed thoroughly in a warm aqueous non-ionic detergent solution and then rinsed thoroughly with warm distilled water (or demineralised water of specific resistance of at least 10^5 ohm·cm).

The cleaned panels should be dried by evaporation of the final washing water and may be warmed to remove any traces of condensed moisture. Care should be taken to ensure that the prepared surface is not touched by hand or otherwise contaminated before painting.