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International Standard ISO 5190

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Anodizing of aluminium and its alloys — Evaluation of uniformity of appearance of architectural anodic finishes — Determination of diffuse reflectance and specular gloss

Anodisation de l'aluminium et de ses alliages — Contrôle de l'homogénéité d'aspect des couches anodiques colorées — Mesurage de la diffusance et de la réflectance

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5190 was developed by Technical Committee ISO/TC 79, *Light metals and their alloys*, and was circulated to the member bodies in March 1983.

It has been approved by the member bodies of the following countries:

Australia
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Canada
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Germany, F.R.
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Anodizing of aluminium and its alloys — Evaluation of uniformity of appearance of architectural anodic finishes — Determination of diffuse reflectance and specular gloss

1 Scope and field of application

This International Standard specifies a method of determining the diffuse reflectance and specular gloss of architectural anodic finishes on aluminium and its alloys in order to evaluate their uniformity of appearance. The method is intended for use as a rapid in-plant technique.

It is suitable for most finishes, including those produced by integral colour anodizing, those having electrolytically impregnated colours, as well as coloured anodic oxide coatings produced using organic or inorganic dyes.

2 References

ISO 2813, *Paints and varnishes — Measurement of specular gloss of non-metallic paint films at* 20°, 60° *and* 85°.

ISO 7668, *Anodic oxidation of aluminium and its alloys — Measurement of specular reflectivity at angles of* 20°, 45°, 60° *and* 85° *with a fixed angle reflectometer.*[1)]

3 Principle

Measurement of the diffuse reflectance and specular gloss of test specimens of the architectural anodic finish and comparison with reference standards prepared using the same finishing cycle.

Diffuse reflectance, which is dependent primarily on the overall lightness-darkness of the surface, and specular gloss, which is dependent primarily on the degree of etch, characterize the general appearance of architectural anodic finishes. Therefore, two surfaces with the same diffuse reflectance and specular gloss should, for the same type of anodic finish, produce matching visual appearance.

4 Apparatus

The measurements are carried out using a diffuse reflectometer composed of

a) the instrument proper, including the indicator and the controls;

b) the testing assembly (two testers) including a light source for illuminating the sample at a fixed angle and the photocell receiving the reflected light rays:

1) a tester used to measure specular reflectivity at an angle of 60° (according to ISO 2813) or of 45°, (according to ISO 7668); an example of a tester is illustrated in figure 1,

2) a tester used to measure the intensity of the diffuse reflected light under a chosen angle; a device particularly suitable for this measurement is illustrated in figure 2; it includes:

— an optical system to illuminate the sample, composed of a beam of parallel light rays of diameter 18 mm, directed at right angles to the sample surface,

— a ring shaped concentric photocell which is not influenced by the intensity of the specularly reflected light.

5 Reference standards

Two reference standards, one for each limit of the allowable range of appearance, shall be used. They shall be finished using the same finishing cycle as used for the production samples.

1) At present at the stage of draft.

6 Procedure

6.1 Measure the diffuse reflectance of the two reference standards using the 610 Y head (see figure 2), with the scale adjusted to give a maximum difference between the readings. Then, without changing the scale settings, measure the diffuse reflectance of the test specimens selected from the production lot.

6.2 Connect the specular gloss heads to the instrument and measure the specular gloss of the two reference standards with the scale adjusted to give a maximum difference between the readings. Then, without changing the scale settings, measure the specular gloss of the test specimens selected from the production lot.

7 Acceptance criteria and significance

7.1 For compliance, the diffuse reflectance and specular gloss values of the test specimens shall be between the limits established by the reference standards.

7.2 If the specular gloss values of the test specimens are within the limits established by the reference standards, but the diffuse reflectance values are not, the surface topography is correct, but the lightness-darkness is not. If the diffuse reflectance is too high, the surface is too light. If the value is too low, the surface is too dark. Changes in the anodizing operation should correct this.

7.3 If the diffuse reflectance values of the test specimens are within the limits established by the reference standards, but the specular gloss values are not, the surface pretreatment is probably incorrect. If the value is too high, the caustic etching is probably inadequate.

7.4 If both the specular gloss and diffuse reflectance values of the test specimens are outside the limits established by the reference standards, several processing steps are probably outside the operating limits.

8 Test report

The test report shall include the following information:

a) the reference of the method used;[1)]

b) a description of the instrument used;

c) the average values of diffuse reflectance and specular gloss, as related to those of the reference standards, for test specimens taken from each rack load.

1) Other methods of measuring specular gloss are described in ISO 2813. Methods of measuring diffuse reflectance are specified in ISO 2469, *Paper, board and pulps — Measurement of diffuse reflectance factor*, ISO 2470, *Paper and board — Measurement of diffuse blue reflectance (ISO lightness)*, and ISO 2471, *Paper and board— Determination of capacity (paper backing) — Diffuse reflectance method*.

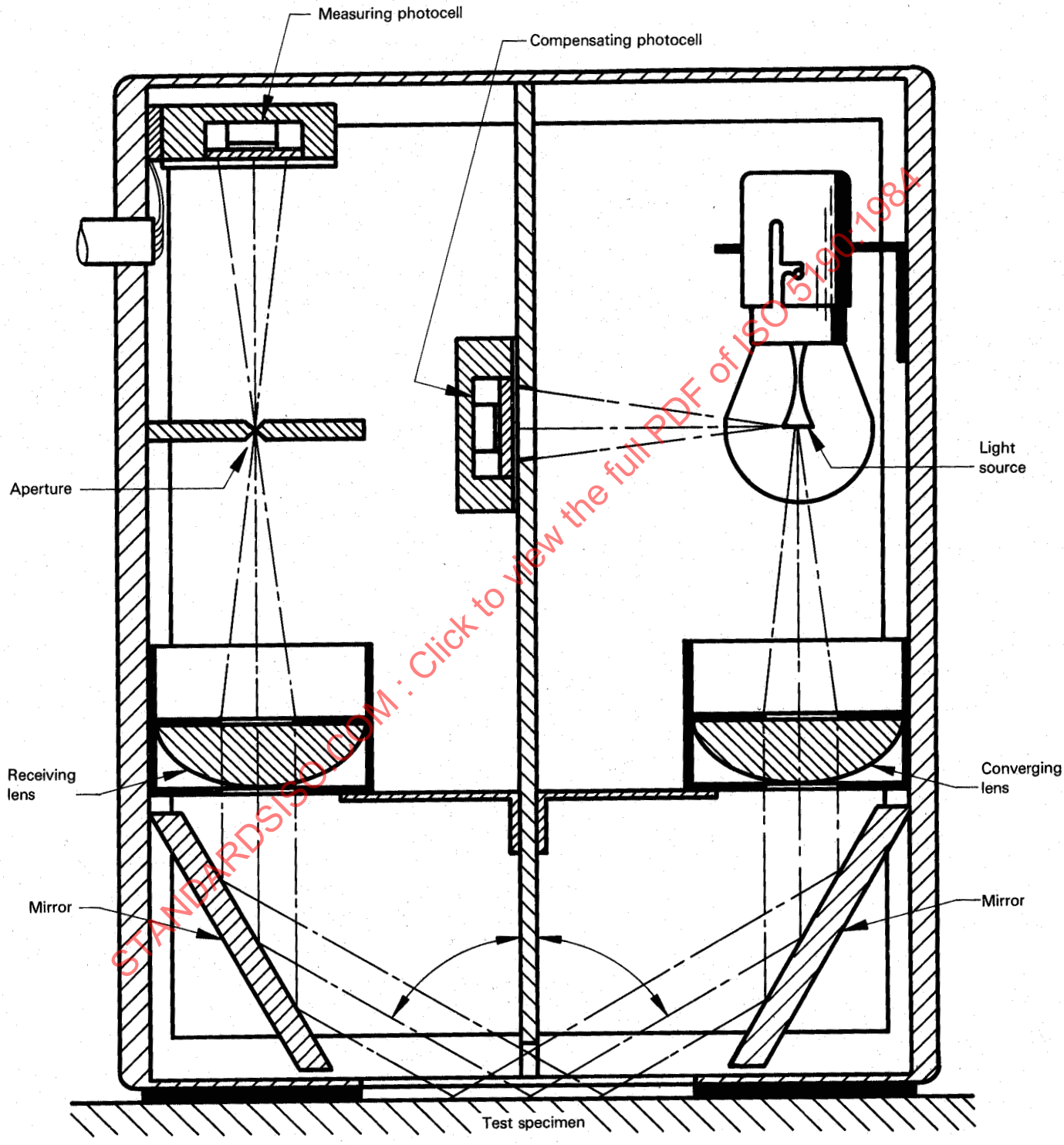

Figure 1 — Example of a tester for measurement of specular gloss

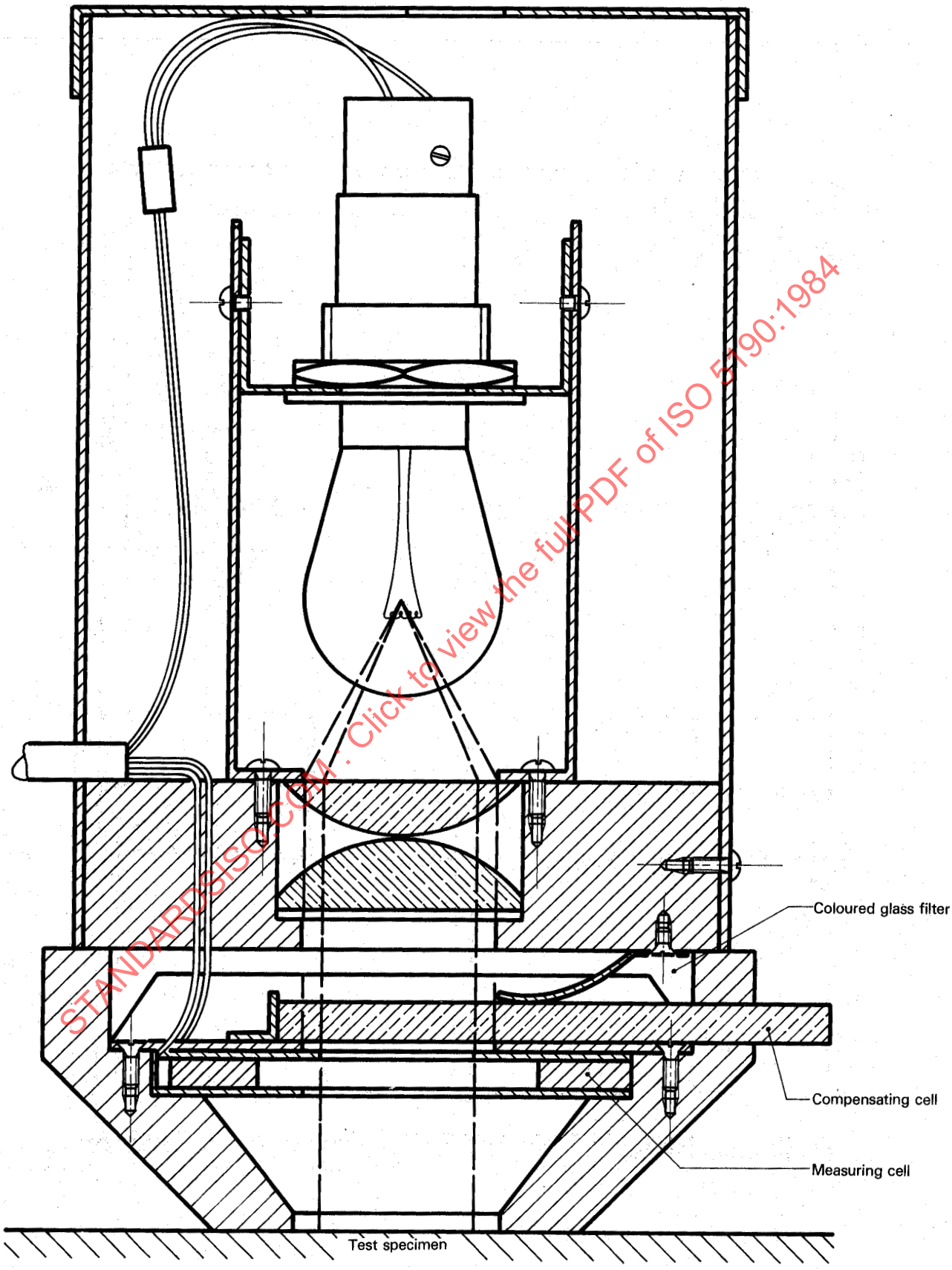

Figure 2 — Example of a tester for measurement of diffuse reflectance