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**Paper and board—Determination
of opacity (paper backing)—
Diffuse reflectance method**

ICS 17.180.99; 85.060

Descriptors : paper, opacity, reflectance factor

Reference number : JIS P 8149 : 2000 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from the Japan Technical Association of the Pulp and Paper Industry (JAPAN TAPPI)/the Japanese Standards Association (JSA), with a draft of Industrial Standard based on the provision of Clause 1, Article 12 of the Industrial Standardization Law.

In order to conform to the International Standard, this Standard has been prepared based on **ISO 2471 : 1998** *Paper and board—Determination of opacity (paper backing)—Diffuse reflectance method*.

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Paper and board—Determination of opacity (paper backing)—Diffuse reflectance method

Introduction This Japanese Industrial Standard has been prepared based on the third edition of **ISO 2471** *Paper and board—Determination of opacity (paper backing)—Diffuse reflectance method*, published in 1998, without modifying the technical contents.

Portions underlined with dots are the matters not included in the International Standard.

1 Scope This Standard specifies a method for the determination of the opacity (paper backing) of paper and board by diffuse reflectance/0° light acceptance. This Standard applies to white and near-white papers and boards.

Remarks : The International Standard corresponding to this Standard is given below.

The symbols indicating the degree of correspondence shall be IDT (identical), MOD (modified) and NEQ (not equivalent) based on ISO/IEC Guide 21.

ISO 2471 : 1998 *Paper and board—Determination of opacity (paper backing)—Diffuse reflectance method* (MOD)

Information : Paper or board that has been treated with a fluorescent dyestuff or exhibits significant fluorescence may be measured, but the agreement between values obtained with different instruments may be unsatisfactory.

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For these normative references, the most recent editions of the standards (including amendments) shall be applied.

JIS P 0001 *Paper, board and pulp—Vocabulary*

Remarks : ISO 4046 : 1978 *Paper, board, pulp and related term—Vocabulary* is equivalent to the said standard.

JIS P 8110 *Paper and board—Sampling for testing*

Remarks : ISO 186 : 1994 *Paper and board—Sampling to determine average quality* is equivalent to the said standard.

JIS Z 8105 *Glossary of colour terms*

JIS Z 8120 *Glossary of optical terms*

JIS Z 8401 *Guide to the rounding of numbers*

JIS Z 9041-1 *Statistical interpretation of data—Part 1 : Statistical presentation of data*

ISO 2469 *Paper, board and pulps—Measurement of diffuse reflectance factor*
ASTM E 308-96 *Computing the Colors of Objects by Using the CIE System*

3 Definitions The definitions of main terms used in this Standard shall be as follows, in addition to those specified in **JIS P 0001**, **JIS Z 8105** and **JIS Z 8120**:

- a) **reflectance factor, R** : The ratio, expressed as a percentage, of the radiation reflected by a body to that reflected by the perfect reflecting diffuser under the same conditions.
- b) **luminous reflectance factor, R_y** : The reflectance factor defined with reference to the CIE illuminant C and CIE 1931 (2°) colour matching function $\bar{y}(\lambda)$ (equivalent to the tristimulus value Y with the light source C and 2 degrees of visual field), and corresponding to the attribute of visual perception of the reflecting surface.
- c) **single-sheet luminous reflectance factor, R_0** : The luminous reflectance factor of a single sheet of paper with a black cavity as backing.
- d) **intrinsic luminous reflectance factor, R_∞** : The luminous reflectance factor of a layer or pad of material thick enough to be opaque, i.e. such that increasing the thickness of the pad by doubling the number of sheets results in no change in the measured reflectance factor.
- e) **opacity (paper backing), O_p** : The ratio, expressed as a percentage, of the single-sheet luminous reflectance factor, R_0 , to the intrinsic luminous reflectance factor, R_∞ , of the same sample.

4 Principle The luminous reflectance factor of a single sheet of the paper over a black cavity and the intrinsic luminous reflectance factor of the paper are determined by measurement according to **ISO 2469**. The opacity is calculated as the ratio of these two values.

5 Apparatus Apparatus shall be as follows:

- a) **Reflectometer**, having the geometric, spectral and photometric characteristics described in **ISO 2469**, Annex A, equipped for the measurement of luminous reflectance factor, and calibrated in accordance with the provisions of **ISO 2469**, Annex B.
- b) **Spectral properties of the reflectometer** In the case of a filter reflectometer (photoelectric colorimeter), the reflectometer shall have an overall optical characteristics equivalent to the CIE tristimulus value Y of the CIE 1931 (2°) standard colorimetric system (XYZ colorimetric system) of the test piece evaluated for the CIE illuminant C.

In the case of an abridged spectrophotometer, it shall have a function that permits calculation of the CIE tristimulus value Y of the CIE 1931 (2°) standard colorimetric system of the test piece evaluated for the CIE illuminant C using the weighting functions given in Table A.1 of Annex A.

- c) **Working standards**: two plates of flat opal glass or ceramic material, cleaned and calibrated as described in **ISO 2469**.