

KOREAN INDUSTRIAL STANDARD

Printing Specifications for Optical Character Recognition

1. Scope

This Korean Industrial Standard specifies the alphanumeric character shapes for optical character recognition (referred to as "OCR") and the printing requirements for printing the specified characters, including:

- (1) The optical properties of the paper to be used.
- (2) The optical and dimensional properties of each printed OCR character.
- (3) The basic requirements related to the position of OCR characters printed on the paper.

2. Definitions

The primary definitions used in this standard shall be as follows.

Remark (9) to (16) shall be referred to Appended Figure.

(1) Document

Document is the general term of input media in OCR. Generally, it is divided into document, page, journal tape.

(2) Spectral Band

The spectral amplitude region established to specify the optical characteristics of paper, ink and printing graphic used in OCR. There are several kinds of classification from near ultraviolet spectrum to near infrared spectrum.

(3) Backing Method

The method for measuring the opacity and reflection ratio. Sufficient backing method refers to such backing method established, so that the variance of the measured value can not be verified even by doubling the number of papers when paper of same quality as of the specimen to be measured in backing. The black backing method is a black plate with reflection ratio of 0.5% max. is the same as the specimen backing.

Related Standard

KS C 5608 Alphanumeric Character Sets for Optical Character Recognition

(4) Printing Diagram

The pattern including the character printed in sheet number and the circumjacent space.

(5) Line Element

A segment of line which has width composing each character.

(6) Range

The allowable degree of character quality. There are 3 classes X, Y, Z.

(7) PCS (Print Contrast Signal)

The quantity which is defined for the purpose of measuring the optical characteristics of printing graphic.

(8) COL(Character Outline Limits)

The character outline limit established in order to measure the dimensional characteristics of printing graphic.

(9) Document Reference Side

The side of Document which becomes the reference of printing position.

(10) Character Boundary

The minimum rectangle which includes all the stroke element of 1 character and of which each side is parallel or perpendicular to the reference side of sheet number.

(11) Printing Area

In the case of a document, the minimum rectangular area which is determined in advance for the purpose of printing the recognition object character of 1 article in one row, and of which each side becomes perpendicular or parallel to the document reference side. In the case of page or journal tape, the minimum rectangular area which includes all character boundaries of the printed recognition object character of 1 article on 1 row, and of which each side becomes perpendicular or parallel to the sheet number reference side.

(12) Clear Area

A rectangle area which includes one printing region and a circumjacent space, and of which each side is perpendicular or parallel to the reference side of document.

(13) Margin in Side

The distance from each edge of document to the printing region.

(14) Space between Characters

The horizontal distance between the boundaries of adjacent 2 characters within the same printing region.

(15) Interval between Characters

The horizontal distance between the vertical bisector of the boundaries of adjacent 2 characters within the same printing region.

(16) Character Horizontality

The vertical distance between the horizontal bisector of the boundaries of 2 characters within the same printing region.

3. Spectral Band

Spectral band shall be as shown in the following Table 1. The spectral characteristic curve of each band should be smooth with a single peak.

Table 1

unit : mm

Spectral Band	Peak	Band width of Level
B 425	425 ± 5	50 max.
B 460	460 ± 5	60 max.
B 490	490 ± 5	60 max.
B 530	530 ± 5	60 max.
B 570	570 ± 10	100 max.
B 620	620 ± 10	100 max.
B 680	680 ± 10	120 max.
B 900	900 ± 50	400 max.

4. Characteristics of OCR Paper**4.1 Optical requirements for OCR paper**

In order to secure a high contrast and uniform reflection ratio between recognition object characters, the paper which is used in OCR set number shall satisfy the following requirements.

- (1) The paper should be white and of high opaque degree
- (2) The paper should have no spots, as much as possible, and should be smooth and lusterless.
- (3) Because a fluorescent material may cause a change of reflection ratio in a specific spectral band, if possible, mixture of papers must be avoided.

4.2 Reflection Ratio of Paper

The reflection ratio of paper shall be as in the following Table 2.

Table 2

Spectral Band	Reflection Ratio
B 425(°), B 460, B 490	60% min.
B 530 or B 570(°), B 620, B 680	70% min.
B 900(°)	70% min.

Notes (1) Paper of good condition is measured at B 425, and B 530 or B 570.

- (2) When reflection ratio near the infra-red spectrum is necessary, it is measured at B 900.

Reflection ratio is compared with MgO as a primary standard of white. The reflection ratio of MgO shall be fixed at 100% and reflection light of used spectral band which happens nothing shall be fixed at 0%. This measurement shall be carried by using proper enough for a circle or an equilateral polygon of the area Min. 65mm².

4.3 Paper Opacity and Change of Reflection Ratio

The paper opacity and the change of the reflection ratio shall be as in Table 3.

Table 3

Grade	Paper Opacity	Reflection Ratio Change of Paper
High Opacity Paper	85% Min.	A standard deviation reflection ratio is not more than 3.5% of average value.
Medium Opacity Paper	70% Min.	A standard deviation reflection ratio is not more than 5% of average value.

(1) Opacity

The opacity C shall be defined as follows. For the required measurement the spectral band of Number 2 in Table 4 shall be adopted.

$$C = \frac{R_B}{R_t} \times 100(\%)$$

where R_B : The reflection ratio where the paper is measured by black backing method.

R_t : The reflection ratio where the paper is measured by sufficient backing method.

Table 4

Number	Applicable Spectral Band	Remark
1	B 425	Near ultraviolet spectrum
2	B 530 or B 570 and it has peak between both of these and the width of band is max. 100nm.	Visibility
3	B 900	Near infrared spectrum

4.4 Dirt in Paper

Dirt in paper shall be as shown in Table 5. In this case, foreign particles of low reflection ratio and with a minimum diameter of 0.1mm shall be regarded as dirt.

Table 5

Item	Stipulated Size
Total Number	250 piece / m ² Max.
Ratio of Area	10 / 1,000,000 Max.

5. Characteristics of Printing Diagram**5.1 Condition for Guarantee of Printing Quality**

As the characteristics of OCR system has been largely influenced by printing quality the following conditions are stipulated for guaranteeing excellent printing quality.

- (1) Printing character shall have a higher contrast in comparison with sheet number becoming the background as much as possible.
- (2) The stroke width, if possible, should be close to the standard size.
- (3) The inside of stroke element outline should have no void. If this condition can