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**Ergonomics—Office work with
visual display terminals (VDTs)—
Visual display requirements
(Amendment 1)**

JIS Z 8513: 1994 has been revised under date of June 20, 2006. The revised items are included in this Amendment 1.
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Foreword

This translation has been made based on the Amendment to the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Ergonomics Society (JES)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14. Consequently **JIS Z 8513**:1994 is partially replaced with this Amendment.

This Amendment has been prepared based on Amendment 1 to **ISO 9241-3**:1992 *Ergonomic requirements for office work with visual display terminals (VDTs)—Part 3: Visual display requirements* published in 2000 with some modifications of the technical contents.

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Ergonomics—Office work with visual display terminals (VDTs)— Visual display requirements (Amendment 1)

Introduction This Amendment has been prepared based on Amendment 1 to the **ISO 9241-3:1992** *Ergonomic requirements for office work with visual display terminals (VDTs)—Part 3: Visual display requirements* published in 2000 with some modifications of the technical contents.

JIS Z 8513:1994 is revised as follows:

1—(Modification given in this clause of the Japanese version of this Amendment is not relevant to the English version.)

2 Add the following to the last sentence in clause **0** “Introduction”:

Annex C forms a normative part of this Standard. Annexes A, B and D are for information only.

In addition, the portions underlined with dots in this Standard are the matters in which the contents of the original International Standard have been modified. A list of modifications with explanations is given in Annex 2 (informative).

3 Insert the following at the end of the clause of “Scope”.

NOTE : The International Standard corresponding to this Standard is as follows.

In addition, the symbols which denote the degree of correspondence in the contents between **JIS** and the relevant International Standard are **IDT** (identical), **MOD** (modified) and **NEQ** (not equivalent) according to **ISO/IEC Guide 21**.

ISO 9241-3:1992 *Ergonomic requirements for office work with visual display terminals (VDTs)—Part 3: Visual display requirements* (MOD)

4 Replace **7.1** with the following:

7.1 Conformance with this Standard is achieved by meeting all the mandatory requirements of clause **5**.

Where the physical measurements required to comply with clause **5** cannot be carried out because the display under test uses a new technology that makes the metrological measurements difficult or impossible, conformance is achieved by obtaining a positive result using the test method and associated mandatory requirements specified in Annex C.

5 Delete **7.2 e)** and Note in 7.2.

6 Replace Annex C with the following:

Annex C (normative)

Visual performance and comfort test

C.1 Principle

C.1.1 Purpose and use (of this Annex) This Annex describes a procedure for testing the visual quality of VDTs where the entire set of physical requirements (defined in clause 5) cannot be applied, for example, to novel display technologies such as new types of flat panel display (such as electroluminescent and field emission displays). The test consists of a search task and an assessment of visual comfort. The combination of test results will be referred to as the visual quality of a display.

C.1.2 Intent and scenario (of this Annex) The intention behind this Annex is to provide a test method for displays that cannot otherwise be tested for conformance with the text. This test method is not an alternative test method, in the sense that a display manufacturer can choose either the physical requirements specified in clause 5 or this method. Instead, the test method provides a testing route for displays that cannot be tested according to the requirements specified in clause 5 because the display under test uses a new technology that makes the metrological measurements specified in clause 6 difficult or impossible (see 7.1).

C.1.3 Overview of test method This test procedure measures the effectiveness of the transfer of visual information in terms of participants' search performance for targets embedded in alphanumerics on a candidate display versus those same participants' performance for such a task on a benchmark display. Effectiveness in this context means that the user is able to detect and recognize the visual targets accurately, quickly and without visual discomfort. If the display passes this particular visual search and rating performance test, it can be assumed capable of other presentations of information such as (but not limited to) non-alphanumeric languages and business graphics. The dependent variables of the test are the search velocity achieved by the test participants in a visual letter search task and subjective ratings of visual comfort using a category scale. The combination of the test results will be referred to as the visual quality of a display. Testing takes place in a simulated office environment, with test participants representative of the anticipated user population.

The method i.e. a letter search task applying pseudo-text in combination with scaling of experienced visual comfort, was first developed and tested by researchers of the IPO, Center for Research on User-System Interaction (Boschman & Roufs^[3]).

The visual quality of a display, referred to as a test display, is assessed against a benchmark display known to meet or exceed the mandatory requirements of clause 5 of the text. Both the velocity in the visual search task and the subjective ratings must meet certain minimum requirements for the test display to pass. Sequential statistics, or an equally robust equivalent statistical procedure, are used to determine if the participant's performance on the test display exceeds or falls short of performance on the benchmark display.

C.1.4 Avoidance of bias All tests are open to bias, and this is especially true in the area of psychological testing. The assessment should therefore be carried out under the supervision of those qualified to carry out such testing, with the necessary education and at least one year of experience. Rules governing the ethical conduct of human experimental testing should be followed. Examples of such rules can be found in the American Psychological Association (1990)^[23] and the British Psychological Society (1991)^[27].

The test administrator should ensure that all potential sources of error are minimized or controlled. The following list describes some potential sources of bias and error; the list is not intended to be complete.

- Selection of test participants (e.g. avoid selection of particular age groups).
- Configuration of displays (during the test, the benchmark display shall meet all the requirements of clause 5 of the text).
- Environmental conditions (lighting and other conditions shall be equal for both displays, to avoid detrimental conditions for one of them).
- Instructions to the test participants (these should be impartial).

C.2 Test participants Test participants should be a sample representing the anticipated user population (those who perform office tasks as specified in the scope of the text). All test participants shall have near visual acuity that is normal, or corrected to normal, at the design viewing distance and shall be without any obvious physical or physiological conditions that could influence either their search performance or their perceived image quality.

C.3 The displays The test display shall be a production or full-feature pre-production unit. It shall incorporate all anti-glare and reflection filters and treatments that will be in the production unit. The benchmark display shall be supplied or nominated by the supplier of the test display and shall meet or exceed all mandatory requirements in clause 5 of the text.

The display may be labelled for identification purposes (e.g. “Display 1” and “Display 2”). Under these conditions, the test participants should not be informed which is the test and which is the benchmark display, so half of them should have the test display labelled as “Display 1” and the other half should have the benchmark display labelled as “Display 1”.

C.4 Test workstation and environment

C.4.1 General requirements The test shall be conducted in an area that is free from distractions and external interference which could influence the test results. The ambient conditions shall fall within the range defined in **ISO 9241-6**. These conditions shall be comfortable and shall not be subject to significant variation during the test, both within a test participant’s session and between test participants.

C.4.2 Environment The thermal environment, the background noise level, the ambient lighting, and the reflectance of work surfaces shall meet the minimum requirements in **JIS Z 8515** and **ISO 9241-6**. The ambient illumination shall be designed to

minimize glare and specular reflections (see **JIS Z 8517**). Constant lighting conditions shall be maintained both within a participant's session and between test participants. The test participants shall be light-adapted by being placed in the test room for 10 min prior to the test.

NOTE : This period may be used by the experimenter to instruct each test participant about the test.

C.4.3 Workstation for the test The display and associated equipment (for example, the keyboard) shall be supported by a work surface that meets the requirements of **JIS Z 8515**.

For both the benchmark display and the test display, the viewing distance shall be set according to their design viewing distance. This distance should be constrained by a head-and-chin rest, the height of which is adjustable. The individual height adjustments for the test participants should be such that for both the test display and the benchmark display, the position of the eyes with respect to the display is equal for all test participants. The position of the test participant's eyes shall comply with the line-of-sight angle requirements in **5.2** of the text.

The brightness and contrast settings of the benchmark display shall be specified by the manufacturer who nominates the display: at these settings it shall meet or exceed all mandatory requirements in clause **5** of the text.

NOTE : A measurement procedure for specifying brightness and contrast is given in the text.

According to the manufacturer's wishes, the brightness and contrast settings of the test display should be either

- a) fixed at settings specified by the manufacturer, or
- b) adjustable by test participants to their personal optimum settings.

Both displays shall be allowed to warm-up for at least 20 min prior to the test.

The test participant shall be seated in a chair that meets the requirements of **JIS Z 8515**.

C.5 Methods

C.5.1 Test material The test material shall be pseudo-text generated from a character set associated with an 8-bit single-byte coded graphic character set as given in **ISO/IEC 8859**, which describes a collection of character sets for various languages. If a system cannot display text in an alphabet familiar to the users, text should be displayed by double-byte coded characters (e.g. Asian characters). In this case, the language used shall be specified in the compliance statement. Each test will use a specified character subset (e.g. "A" ... "Z", "a" ... "z", and "0" ... "9"). The same subset shall be used for both displays.

Pseudo-text shall be generated from the character set according to the following constraints.

- Pseudo-texts shall consist of blocks of random strings of characters separated by spaces.

- The texts, on both test and benchmark display, shall consist of a constant number of lines and a constant number of characters per line (including space characters).
- The number of characters per line shall be chosen so that the line length (in centimetres) is less than 25 times the line-to-line distance (i.e. the height of the display area divided by the maximum number of lines). However, a line should contain at least 30 characters (including embedded spaces). The total number of characters in a pseudo-text shall be between 400 and 600, embedded spaces included. The pseudo-text blocks (see **C.5.2**) shall be sized such that, if 5 blocks could be displayed at once (one in each corner and one in the middle), they would have minimum overlap while maximizing coverage of the display area. In the case of using 2-byte characters, the total number may be half of the number specified above.
- Each test participant is instructed to count the occurrences of a single target character over the entire test (e.g. test participant x is instructed to search for “A”s during the entire test, test participant y is instructed to search for “R”s, ..., etc. In the case of using 2-byte characters, the test participant is instructed to search for, “厶”s, in Japanese.).

Information : “□” shall not be the target character because it can affect the test results (the same applies to ∟, ソ, □, コ, り, リ).

- The number of targets shall be 2 % to 3 % of the total number of characters in the text, including embedded spaces.
- The position of the targets shall be randomly chosen with the restriction that a line may not start or end with the target character.
- The texts shall contain a constant number of spaces. The space fraction shall be 15 % (i.e. the number of spaces relative to the total number of characters, including embedded spaces). Although the average word length does vary over different languages, pseudo-texts with 15 % space fraction, in a way, do resemble normal texts with respect to their string length distributions.

The position of the spaces shall be randomly chosen with the following restriction:

- a) a line shall neither start nor end with a space character (all spaces are embedded);
- b) a space character shall not be adjacent to another space character (strings are separated by single spaces);
- c) the minimum string length shall be 2 characters.

C.5.2 Procedure Display pseudo-text as a block of characters in one of five screen locations. The test participant’s task is to scan the text and identify the presence of the target character.

Place the blocks of pseudo-text in the upper left, the upper right, the lower left, the lower right and the centre of the screen. Locate the centre block so that the middle character of the block is approximately in the centre of the active area of the screen. Place text in each of the four corners so that it abuts the extreme corners of the screen.