

COMMITTEE TE-001

**DR AS/NZS 5815.1**

(Project ID: 100963)

# Draft for Public Comment Australian/New Zealand Standard

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*Important: The procedure for public comment has changed – please read the instructions on the inside cover of this document.*

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**Information technology equipment—Energy  
performance of computer monitors  
Part 1: Methods of measurement**

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## Draft for Public Comment Australian/New Zealand Standard

The committee responsible for the issue of this draft comprised representatives of organizations interested in the subject matter of the proposed Standard. These organizations are listed on the inside back cover.

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**Draft for Public Comment**

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Committee TE-001—Safety of Electronic Equipment

Subcommittee TE-001-10—MEPS for Computer monitors

**DRAFT**

**Australian/New Zealand Standard**

Information technology equipment—Energy performance of computer monitors

Part 1: Methods of measurement

(To be AS/NZS 5815.1:20XX)

Comment on the draft is invited from people and organizations concerned with this subject. It would be appreciated if those submitting comment would follow the guidelines given on the inside front cover.

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This document is a draft Australian/New Zealand Standard only and is liable to alteration in the light of comment received. It is not to be regarded as an Australian/New Zealand Standard until finally issued as such by Standards Australia/Standards New Zealand.

## PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Technical Committee TE-001, Safety of Electronic Equipment.

The objective of this Standard is to provide designers, manufacturers, importers, test laboratories, regulators and users of Computer monitors the power consumption measurement method to be used to assess the minimum energy performance standards (MEPS) specified in Part 2 of this Standard for these devices.

This Standard is published with the approval of Australian and New Zealand regulatory authorities and is structured to be suitable for reference in regulations.

This series, when complete, will consist of the following parts:

AS/NZS

5815 Information technology equipment—Energy performance of computer monitors

5815.1 Part 1: Methods of measurement

5815.2 Part 2: Definitions and minimum energy performance standards (MEPS)

The terms ‘normative’ and ‘informative’ are used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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## FOREWORD

In Australia, the energy labelling and MEPS requirements set out in AS/NZS 5812.2 are intended to be in force no earlier than 1 October 2012. Computer monitors covered in AS/NZS 5812.2 that are imported into Australia or manufactured in Australia beyond the effective date, that do not comply with the requirements of AS/NZS 5812.2, will be deemed non-compliant and may not be permitted to be sold in Australia. Information can be found at the <http://www.energyrating.gov.au> website.

DRAFT

## STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

**Australian/New Zealand Standard****Information technology equipment—Energy performance of computer monitors****Part 1: Methods of measurement**

## SECTION 1 SCOPE AND GENERAL

**1.1 SCOPE**

This Standard specifies methods to measure computer monitor power consumption to determine compliance with the MEPS requirements for computer monitors specified in AS/NZS 5815.2. This Standard has been developed as a general measuring standard for computer monitors and can be used for purposes other than determining MEPS compliance.

**1.2 APPLICATION**

This Standard shall be read in conjunction with AS/NZS XXXX.2: Computer Monitor MEPS Requirements.

**1.3 REFERENCED DOCUMENTS**

The following documents are referred to in this Standard:

AS	
2706	Numerical values—Rounding and interpretation of limiting values
AS/NZS	
4665	Performance of external power supplies
4665.1	Part 1: Test method and energy performance mark
4665.2	Part 2: Minimum energy performance standard (MEPS) requirements
5815	Information technology equipment—Energy performance of computer monitors
5815.2	Part 2: Definitions and minimum energy performance standards (MEPS)
IEC	
60050-300	International Electrotechnical Vocabulary—Electrical and electronic measurements and measuring instruments
62087	Methods of measurement for the power consumption of audio, video and related equipment
IEEE	
100	The Authoritative Dictionary of IEEE Standards Terms

**1.4 DEFINITIONS**

For the purpose of this Standard, the definitions given in IEC 60050-300 and IEEE 100, and those below, apply.

**1.4.1 Automatic brightness control (ABC)**

A feature that adjusts the brightness of the computer monitor according to the illuminance level where it is being used.

### 1.4.2 Computer monitor

A commercially-available product with a display screen and associated electronics, often encased in a single housing, that as its primary function displays visual information from a computer, workstation or server via one or more inputs, such as VGA, DVI, HDMI, or IEEE 1394 or through a wireless connection.

Common computer monitor technologies include liquid crystal display (LCD), light emitting diode (LED), cathode-ray tube (CRT), and plasma display panel (PDP).

### 1.4.3 Off mode

The operational mode of a computer monitor that is—

- (a) connected to a power source;
- (b) engaged by a power switch; and
- (c) not providing any function.

### 1.4.4 On mode

The operational mode of a computer monitor is that displaying an image from a computer.

### 1.4.5 Standby active (sleep) mode

The operational mode of a computer monitor that is—

- (a) connected to a power source;
- (b) has all mechanical (hard) power switches turned on; and
- (c) has been placed into a low-power mode by receiving a signal from an externally connected device (e.g. computer, game console, or set-top box) or by cause of an internal function such as a sleep timer or occupancy sensor.

## SECTION 2 MEASURING CONDITIONS

### 2.1 GENERAL MEASURING CONDITIONS

#### 2.1.1 Power measurements

Unless otherwise stated, numbers shall be rounded and recorded to four significant figures in accordance with AS 2706.

Power measurements shall be performed according to AS/NZS 5815.1. On mode power measurements shall be rounded to one decimal place. Off Mode and Standby Active mode power measurements shall be rounded to 2 decimal places. The input on the computer monitor to which the video test signal is applied shall be specified in the test report. The test voltage and frequency shall be 230 V and 50 Hz respectively.

For a computer monitor which is powered by an external power supply (EPS), the computer monitor shall be tested with the supplied EPS. The power measurements and other related measurements required by this Standard are those of the combination of the computer monitor and the EPS. In addition, the EPS shall comply with AS/NZS 4665.1 and AS/NZS 4665.2.

#### 2.1.2 Power supply

Measurements shall be carried out using a power supply providing 230 V r.m.s. at 50 Hz the nominal voltage and frequency Australia. The voltage and frequency used during the power measurement shall be described in the report.

The fluctuation of the voltage supplied during the tests shall not exceed 2%. The frequency fluctuation and the harmonic components of the supplied power shall not exceed 2% and 5% respectively.

#### 2.1.3 Environmental conditions

The ambient temperature shall be  $23 \pm 5^\circ\text{C}$ . The ambient temperature shall be described in the report.

#### 2.1.4 Adjustment of controls

The controls not specifically mentioned in this Standard shall be in the position adjusted by the manufacturer for shipment to the end user. These controls shall remain in this state for the duration of the test.

#### 2.1.5 Input signals

For equipment for which the input signals are not explicitly described in this Standard, the nominal signals as specified by the manufacturer shall be applied during the test. The input signals used shall be described in the report.

### 2.2 POWER MEASUREMENT INSTRUMENT

The measurement shall be carried out using a watt-hour meter.

The sampling rate of the watt-hour meter should be high enough to achieve an accurate measurement.

The power measurement instrument used shall measure the actual power consumed regardless of the power factor of the device under test.

Measurements of power of 0.5 W or greater shall be made with an uncertainty of less than or equal to 2% at the 95% confidence level. Measurements of power of less than 0.5 W

shall be made with an uncertainty of less than or equal to 0.01 W at the 95% confidence level. The power measurement instrument shall have a resolution of—

- (a) 0.01 W or better for power measurements of 10 W or less;
- (b) 0.1 W or better for power measurements of greater than 10 W up to 100 W; or
- (c) 1 W or better for power measurements of greater than 100 W.

For equipment connected to more than one phase, the power measurement instrument shall be equipped to measure total power of all phases connected.

NOTES:

- 1 In the case of standby mode power measurement, it should be ascertained that the wattmeter or the watthour meter is suitable to measure the power consumption of power supplies working in a burst mode with a low duty cycle and the low power consumption levels in the standby modes.
- 2 For digital power meters a sampling rate of at least 10 kHz is recommended. ('Sampling rate' in many specifications refers to how often the computer monitor is updated, and not the actual sampling frequency of the input waveform.) Most digital power meters are believed to meet this requirement. If it is not listed in the manufacturer's specifications, contact the manufacturer.
- 3 For more information about the determination of uncertainty of measurement, refer to IEC 62301:2005, Annex D.

## 2.3 GENERAL MEASUREMENT PROCEDURE

### 2.3.1 Rounding

Unless otherwise stated, numbers shall be rounded and recorded to four significant figures in accordance with AS 2706.

### 2.3.2 Stabilization

The measurements shall be performed after the computer monitor has achieved a stable condition with respect to power consumption.

For Clause 3.3, the measurements shall be made after the computer monitor has been in the off or disconnected mode for a minimum of one hour immediately followed by a minimum of one hour in the on mode and shall be completed before a maximum of three hours in the on mode. The relevant video signal shall be computer monitored during the entire on mode duration. For computer monitors that are known to stabilize within one hour, these durations may be reduced if the resulting measurement can be shown to be within 2% of the results that would otherwise be achieved using the durations described herein.

For standby active low mode power on all test equipment and properly adjust operation range allow the computer monitor to remain in standby active low mode until stable power readings are measured. Measurements are considered stable once the wattage reading does not vary more than 1% over a three-minute period.

### 2.3.3 Procedure

Unless otherwise specified in this Standard, the procedure shall be as follows:

- (a) Measure the power consumption of the appliance at a time not less than 15 min after it has been switched into the relevant operating mode.
- (b) If the power consumption in a certain operating mode has more than one stable level, ensure the measuring time is of an appropriate duration to measure the correct average value.

- (c) For appliances that switch, after a time delay, from a standby mode to a mode with a lower (or zero) power consumption, determine the power consumption before and after the switching.
- (d) The results shall be given in watts (W), with a number of relevant digits in accordance with the accuracy of the measurement.

## 2.4 ON (AVERAGE) MODE MEASURING CONDITIONS FOR COMPUTER MONITORS

### 2.4.1 Video signals

The average power consumption of the computer monitor shall be tested with the dynamic broadcast-content as supplied and specified in IEC 62087 Ed 3.0 (2011). The type of signals used during the measurement shall be described in the report.

### 2.4.2 Input terminals

Input terminals shall conform to the requirements below.

- (a) *Input terminal selection* On (average) mode computer monitor power consumption shall be measured with the video test signals applied to one set of input terminals, and that set of input terminals shall be selected as the source for picture generation by the computer monitor. The selected input terminal(s) used during the measurement shall be described in the report. It is recommended that wherever available the DVI or HDMI terminal is selected as the input terminal.
- (b) *Accuracy of input signal levels* Analogue input signals provided by the signal generating device shall be accurate within 2% of the full range of the video signal when terminated with a 75  $\Omega$  load.

Digital input signal levels should be accurate within the resolution of the signal source equipment used.

SECTION 3 MEASURING METHOD

**3.1 TEST METHOD FOR FIXED PIXEL COMPUTER MONITORS USING A STATIC TEST PATTERN AND *WITHOUT* ABC ENABLED BY DEFAULT**

**3.1.1 On mode power measurement**

Connect the test sample to the power source and test equipment. Power on all test equipment and properly adjust power source voltage and frequency.

Check for normal operation of the test unit and leave all customer adjustments set to factory default settings.

Turn the test unit on and allow the unit under test (UUT) to reach operating temperature (approximately 20 minutes). Set the proper computer monitor mode.

**3.1.2 Setting and measuring the luminance levels**

Using a contact luminance meter or in the case of a non contact meter provide dark room conditions.

Without changing any ‘out of box’ condition the technician shall display a test pattern that contains a 100% window covering 80% of the screen\*. The luminance of the window shall be measured and reported. The brightness shall then be adjusted until the window of the screen is set at the luminance specified in Table 1 for the appropriate resolution.

**TABLE 1  
LUMINANCE LEVELS FOR  
SPECIFIED MP RESOLUTIONS**

Product	Cd/m <sup>2</sup>
Less than or equal to 1.1 MP resolution	175
Greater than 1.1 MP resolution	200

If the computer monitor’s maximum luminance is less than the prescribed luminance in the table above, the maximum luminance shall be used. Similarly, if the computer monitor’s minimum luminance is greater than the prescribed luminance, the minimum luminance shall be used. The luminance used for power measurement shall be reported in the test report.

**3.1.3 Measuring the power consumption**

Allow the unit to stabilize in accordance with Section 2. Measure the energy used, in watthours, over a 3 min period. Record this as  $P_{Meas}$  and the average power used using the formula—

$$P_{avg} = 20 \times P_{Meas}$$

... 3.1

\* The VESA test pattern ‘VESA FPDM Standard 2.0, A1 12-2H, L80’ is an example of a suitable test pattern.

### 3.2 TEST METHOD FOR FIXED PIXEL COMPUTER MONITORS USING A STATIC TEST PATTERN AND *WITH* ABC ENABLED BY DEFAULT

The following test procedure is used to calculate maximum on mode power consumption for computer monitors shipped with automatic brightness control enabled by default. For this test procedure, high ambient lighting is to be set at 300 lx, while low ambient lighting is to be set at 0 lx, as follows:

- (a) Turn the unit under test on and set the ambient light level to 300 lx as measured at the face of the ambient light sensor. Allow the unit under test to stabilize as per Section 2.
- (b) Make the power measurement  $P_h$  as per Clause 3.1.1.2.
- (c) Set the ambient light level to 0 lx as measured at the face of an ambient light sensor. Allow the unit under test to stabilize as per Section 2.
- (d) Make the power measurement  $P_l$  as per Clause 3.1.1.2.

### 3.3 TEST METHOD FOR COMPUTER MONITORS USING THE DYNAMIC BROADCAST-CONTENT VIDEO SIGNAL

#### 3.3.1 Picture level adjustments

The contrast and brightness of the computer monitor and the backlight level, if it exists, shall be set as originally adjusted by the manufacturer to the end user. In the case that a setting mode must be chosen on initial activation, the 'standard mode' or equivalent shall be chosen. In the case that no 'standard mode' or equivalent exists, the first mode listed in the on-screen menus shall be selected. The mode used during the test shall be described in the report.

#### 3.3.2 Video aspect ratio

The computer monitor shall be set in a mode such that the active area of the video input signal fills the entire screen.

#### 3.3.3 On (average) mode testing using dynamic broadcast-content video signal for computer monitors without ABC enabled by default

##### 3.3.3.1 *Measurements using dynamic broadcast-content video signal*

The full duration of the dynamic broadcast-content video signal is used for measuring TV power consumption when the computer monitor is used for viewing typical broadcast TV content. The measurement shall be the average power consumed over ten consecutive minutes.

The dynamic broadcast-content video signal shall be used for stabilization and measurement and shall be generated from one of the video content sources available from the IEC in a format compatible with the input under test. (See IEC 62087:2008 video content\_DVD\_50 through IEC 62087:2008 video content\_BD.) The duration of the video signal is ten minutes.

##### 3.3.3.2 $P_{o\_broadcast}$ : On (average) mode power consumption using dynamic broadcast-content video signal

The computer monitor energy consumption shall be measured in watthours over a 10 minute period using the dynamic broadcast-content test signal. Record this as  $P_{o\_broadcast}$ : On (average). Calculate  $P_{o\_broadcast}$ : On (average) consumption in watts using Equation 3.2.

$$P_{o\_broadcast}: \text{On (average)} \text{ (in watts)} = 6 \times P_{o\_broadcast}: \text{On (average)} \text{ (in watthours)} \quad \dots 3.3$$

### 3.3.4 On (average) mode testing using dynamic broadcast-content video signal for computer monitor computer monitors *with* ABC enabled by default

Set the ambient light level to at least 300 lx measured at the face of an ambient light sensor.

Measure the high ambient lighting on mode power consumption,  $P_h$ , as described in Clause 3.3.3, 'On mode (average) testing using dynamic broadcast-content video signal'.

Set the ambient light level to 0 lx as measured at the face of an ambient light sensor.

Measure the low ambient lighting on mode power consumption,  $P_l$ , as described in Clause 3.3.3, 'On mode (average) testing using dynamic broadcast-content video signal'.

## 3.4 STANDBY AND OFF MODE

### 3.4.1 Standby active mode (power switch on, no video signal)

The unit under test shall be placed in standby mode by removing the video signal. The method of adjustment shall be documented along with the sequence of events required to reach the standby mode.

When the unit under test is stable as per Section 2 record the energy used in watt-hours for a 10 minute period and record this measurement as  $P_{\text{Standby\_kWh}}$ . Using Equation 3.4(1) calculate the average power consumed, in watts, and record this as  $P_{\text{Standby\_Avg}}$ .

$$P_{\text{Standby\_Avg}} = P_{\text{Standby\_kWh}} \times 6 \quad \dots 3.4(1)$$

If the device has different Standby Modes that can be manually selected, the measurement shall be taken with the device in the most energy consumptive of those modes. If the modes are cycled through automatically, the measurement time should be long enough to obtain a true average that includes all modes.

### 3.4.2 Off mode (power switch off) standby mode

Using the on/off switch turn the monitor off. The method of adjustment shall be documented along with the sequence of events required to reach the Off Mode.

When the unit under test is stable as per Section 2 record the energy in watt-hours used for a 10 minute period and record this measurement as  $P_{\text{Off\_Meas}}$ . Using Equation 3.4(2) calculate the average power consumed, in watts, and record this as  $P_{\text{Off\_Avg}}$ .

$$P_{\text{Off\_Avg}} = P_{\text{Off\_Meas}} \times 6 \quad \dots 3.4(2)$$

\*\*\* END OF DRAFT \*\*\*

## PREPARATION OF AUSTRALIAN STANDARDS

Australian Standards are prepared by a consensus process involving representatives nominated by organizations drawn from all major interests associated with the subject. Australian Standards may be derived from existing industry Standards, from established international Standards and practices or may be developed within a Standards Australia technical committee.

During the development process, Australian Standards are made available in draft form at all sales offices and through affiliated overseas bodies in order that all interests concerned with the application of a proposed Standard are given the opportunity to submit views on the requirements to be included.

The following interests are represented on the committee responsible for this draft Australian Standard:

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Australian Communications and Media Authority  
Australian Industry Group  
Australian Information Industry Association  
Australian Subscription Television and Radio Association  
CHOICE  
Certification Interests, New Zealand  
Consumer Electronics Association of New Zealand  
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Energy Networks Association  
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Standards Australia is an independent company, limited by guarantee, which prepares and publishes most of the voluntary technical and commercial standards used in Australia. These standards are developed through an open process of consultation and consensus, in which all interested parties are invited to participate. Through a Memorandum of Understanding with the Commonwealth government, Standards Australia is recognized as Australia's peak national standards body.

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The first national Standards organization was created in New Zealand in 1932. The Standards Council of New Zealand is the national authority responsible for the production of Standards. Standards New Zealand is the trading arm of the Standards Council established under the Standards Act 1988.

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Under a Memorandum of Understanding between Standards Australia and Standards New Zealand, Australian/New Zealand Standards are prepared by committees of experts from industry, governments, consumers and other sectors. The requirements or recommendations contained in published Standards are a consensus of the views of representative interests and also take account of comments received from other sources. They reflect the latest scientific and industry experience. Australian/New Zealand Standards are kept under continuous review after publication and are updated regularly to take account of changing technology.

### **International Involvement**

Standards Australia and Standards New Zealand are responsible for ensuring that the Australian and New Zealand viewpoints are considered in the formulation of international Standards and that the latest international experience is incorporated in national and Joint Standards. This role is vital in assisting local industry to compete in international markets. Both organizations are the national members of ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission).

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