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(¹) Text with EEA relevance

II

(Non-legislative acts)

REGULATIONS

COMMISSION IMPLEMENTING REGULATION (EU) 2015/1399

of 17 August 2015

concerning the denial of authorisation of the preparation of *Bacillus toyonensis* (NCIMB 14858ᵀ) (formerly *Bacillus cereus* var. *toyoi* NCIMB 40112/CNCM I-1012) as a feed additive for cattle for fattening, rabbits for fattening, chickens for fattening, piglets (weaned), pigs for fattening, sows for reproduction and calves for rearing and the revocation of the authorisations of the preparation of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012) as a feed additive for turkeys for fattening and rabbit breeding does, amending Regulations (EC) No 256/2002, (EC) No 1453/2004, (EC) No 255/2005 and (EC) No 1200/2005 and repealing Regulations (EC) No 166/2008, (EC) No 378/2009 and Implementing Regulation (EU) No 288/2013

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EC) No 1831/2003 of the European Parliament and of the Council of 22 September 2003 on additives for use in animal nutrition (¹), and in particular Articles 9(2) and 13(2) thereof,

Whereas:

(1) Regulation (EC) No 1831/2003 provides for the authorisation of additives for use in animal nutrition and for the grounds and procedures for granting, denying or revoking such authorisation. Article 10 of that Regulation provides for the re-evaluation of additives authorised pursuant to Council Directive 70/524/EEC (²).

(2) The preparation of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012) was authorised without a time limit in accordance with Directive 70/524/EEC as a feed additive for piglets under 2 months and sows by Commission Regulation (EC) No 256/2002 (³), for piglets from 2 to 4 months and pigs for fattening by Commission Regulation (EC) No 1453/2004 (⁴), for cattle for fattening by Commission Regulation (EC) No 255/2005 (⁵) and for rabbits for fattening and chickens for fattening by Commission Regulation (EC) No 1200/2005 (⁶). The preparation was subsequently entered in the Register of feed additives as an existing product, in accordance with Article 10(1) of Regulation (EC) No 1831/2003.

(¹) OJ L 268, 18.10.2003, p. 29.
(²) Council Directive 70/524/EEC of 23 November 1970 concerning additives in feedingstuffs (OJ L 270, 14.12.1970, p. 1).
(³) Commission Regulation (EC) No 256/2002 of 12 February 2002 concerning the provisional authorisation of new additives, the prolongation of provisional authorisation of an additive and the permanent authorisation of an additive in feedingstuffs (OJ L 41, 13.2.2002, p. 6).
(⁴) Commission Regulation (EC) No 1453/2004 of 16 August 2004 concerning the permanent authorisation of certain additives in feedingstuffs (OJ L 269, 17.8.2004, p. 3).
(⁵) Commission Regulation (EC) No 255/2005 of 15 February 2005 concerning the permanent authorisations of certain additives in feedingstuffs (OJ L 45, 16.2.2005, p. 3).
(⁶) Commission Regulation (EC) No 1200/2005 of 26 July 2005 concerning the permanent authorisation of certain additives in feedingstuffs and the provisional authorisation of a new use of an additive already authorised in feedingstuffs (OJ L 195, 27.7.2005, p. 6).

(3)   That preparation was also authorised in accordance with Regulation (EC) No 1831/2003 for 10 years for turkeys for fattening by Commission Regulation (EC) No 166/2008 (¹) and for rabbit breeding does by Commission Regulation (EC) No 378/2009 (²).

(4)   In accordance with Article 10(2) of Regulation (EC) No 1831/2003 in conjunction with Article 7 thereof, an application was submitted for the authorisation of the preparation of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012) as a feed additive for cattle for fattening, rabbits for fattening, chickens for fattening, piglets (weaned), pigs for fattening and sows for reproduction and, in accordance with Article 7 of that Regulation, an application was submitted for a new use of that preparation for calves for rearing, both applications requesting the additive to be classified in the additive category 'zootechnical additives'. Those applications were accompanied by the particulars and documents required under Article 7(3) of Regulation (EC) No 1831/2003.

(5)   On the basis of the opinion of 16 October 2012 of the European Food Safety Authority ('the Authority') (³), Commission Implementing Regulation (EU) No 288/2013 (⁴) suspended the existing authorisations of the preparation of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012).

(6)   Implementing Regulation (EU) No 288/2013 refers to the possibility that supplementary data concerning the safety of use of the preparation of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012), to be submitted by the applicant, may bring new elements which would allow a re-consideration of the assessment carried out for that additive. That Regulation further provides for the review of the suspension measure.

(7)   On 6 December 2013, the applicant submitted supplementary data to the Commission, which were subsequently forwarded to the Authority with a request to evaluate them in order to receive a new opinion on the safety and efficacy of the additive.

(8)   In addition, the applicant, on his own initiative, submitted to the Authority additional documentation on 24 April 2014, on 14 May 2014 and on 17 June 2014.

(9)   On 1 July 2014, the Authority adopted an opinion following the assessment of the supplementary data submitted by the applicant (⁵). In its opinion, the Authority considered that the taxonomic re-classification of the strain of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012) as a new species named *Bacillus toyonensis* had no impact on the assessment thereof, as it still belongs to the *Bacillus cereus* group. As regards the antibiotic susceptibility of the *Bacillus toyonensis* strain, the Authority concluded that the supplementary data provided do not alter the previous conclusion that the strain poses a risk for the spread of genes coding for resistance to tetracycline and chloramphenicol, which are antibiotics of human and veterinary importance. On the toxigenic potential of the *Bacillus toyonensis* strain, the Authority concluded that it has the capacity to elaborate functional toxins and, thus, to pose a risk to those exposed to the organism, including those handling the additive and consumers exposed to contaminated animal products.

(10)   On 30 August 2014, the applicant requested the administrative review of the opinion of the Authority of 1 July 2014 and on 17 October 2014 he supplemented his request with additional elements. By Decision of 20 May 2015 (⁶), the Commission concluded that there was no reason to require that the Authority withdraw that opinion.

(11)   Consequently, it has not been established that the preparation of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012), which has been re-classified as a new species named *Bacillus toyonensis* (NCIMB 14858ᵀ), does not have an adverse effect on animal health or on human health, when used as feed additive.

(¹) Commission Regulation (EC) No 166/2008 of 22 February 2008 concerning the authorisation of a new use of the preparation of *Bacillus cereus* var. *toyoi* (Toyocerin) as a feed additive (OJ L 50, 23.2.2008, p. 11).
(²) Commission Regulation (EC) No 378/2009 of 8 May 2009 concerning the authorisation of a new use of the preparation of *Bacillus cereus* var. *toyoi* as a feed additive for rabbit breeding does (holder of the authorisation Rubinum S.A.) (OJ L 116, 9.5.2009, p. 3).
(³) *EFSA Journal* 2012; 10(10):2924.
(⁴) Commission Implementing Regulation (EU) No 288/2013 of 25 March 2013 concerning the suspension of the authorisations of the preparation of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012) as provided for by Regulations (EC) No 256/2002, (EC) No 1453/2004, (EC) No 255/2005, (EC) No 1200/2005, (EC) No 166/2008 and (EC) No 378/2009 (OJ L 86, 26.3.2013, p. 15).
(⁵) *EFSA Journal* 2014; 12(7):3766.
(⁶) C(2015) 3409 final.

(12) The conditions for authorisation, as provided for in Article 5 of Regulation (EC) No 1831/2003, are therefore not satisfied.

(13) Accordingly, the authorisation of the preparation of *Bacillus toyonensis* (NCIMB 14858ᵀ) as a feed additive for cattle for fattening, rabbits for fattening, chickens for fattening, piglets (weaned), pigs for fattening, sows for reproduction and calves for rearing should be denied.

(14) For the same reasons, the conditions for authorisation of the preparation of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012) as a feed additive for use for turkeys for fattening and for rabbit breeding does are no longer fulfilled and those authorisations should be revoked.

(15) Regulations (EC) No 256/2002, (EC) No 1453/2004, (EC) No 255/2005 and (EC) No 1200/2005 should be amended accordingly, and Regulations (EC) No 166/2008 and (EC) No 378/2009 should be repealed.

(16) Implementing Regulation (EU) No 288/2013 should also be repealed.

(17) Since existing stocks of the preparation of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012), of premixtures containing that preparation and of feed materials and compound feed produced from that preparation were already to be withdrawn from the market according to Article 7 of Implementing Regulation (EU) No 288/2013, no transitional measures should be provided for.

(18) The measures provided for in this Regulation are in accordance with the opinion of the Standing Committee on Plants, Animals, Food and Feed,

HAS ADOPTED THIS REGULATION:

Article 1

Denial of authorisation

Authorisation of *Bacillus toyonensis* (NCIMB 14858ᵀ) as an additive in animal nutrition for use for cattle for fattening, rabbits for fattening, chickens for fattening, piglets (weaned), pigs for fattening, sows for reproduction and calves for rearing is denied.

Article 2

Revocation of authorisation

Authorisation of *Bacillus cereus* var. *toyoi* (NCIMB 40112/CNCM I-1012) as an additive in animal nutrition for use for turkeys for fattening and rabbit breeding does is revoked.

Article 3

Amendment to Regulation (EC) No 256/2002

Article 3 of Regulation (EC) No 256/2002 and Annex III to that Regulation are deleted.

Article 4

Amendment to Regulation (EC) No 1453/2004

In Annex I to Regulation (EC) No 1453/2004, the entry E 1701, *Bacillus cereus* var. *toyoi* NCIMB 40112/CNCM I-1012, is deleted.

Article 5

Amendment to Regulation (EC) No 255/2005

In Annex I to Regulation (EC) No 255/2005, the entry E 1701, *Bacillus cereus* var. *toyoi* NCIMB 40112/CNCM I-1012, is deleted.

Article 6

Amendment to Regulation (EC) No 1200/2005

In Annex II to Regulation (EC) No 1200/2005, the entry E 1701, *Bacillus cereus* var. *toyoi* NCIMB 40112/CNCM I-1012, is deleted.

Article 7

Repeal of Regulation (EC) No 166/2008

Regulation (EC) No 166/2008 is repealed.

Article 8

Repeal of Regulation (EC) No 378/2009

Regulation (EC) No 378/2009 is repealed.

Article 9

Repeal of Implementing Regulation (EU) No 288/2013

Implementing Regulation (EU) No 288/2013 is repealed.

Article 10

Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 17 August 2015.

For the Commission
The President
Jean-Claude JUNCKER

COMMISSION IMPLEMENTING REGULATION (EU) 2015/1400

of 17 August 2015

establishing the standard import values for determining the entry price of certain fruit and vegetables

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) No 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organisation of the markets in agricultural products and repealing Council Regulations (EEC) No 922/72, (EEC) No 234/79, (EC) No 1037/2001 and (EC) No 1234/2007 (^{1}),

Having regard to Commission Implementing Regulation (EU) No 543/2011 of 7 June 2011 laying down detailed rules for the application of Council Regulation (EC) No 1234/2007 in respect of the fruit and vegetables and processed fruit and vegetables sectors (^{2}), and in particular Article 136(1) thereof,

Whereas:

(1)   Implementing Regulation (EU) No 543/2011 lays down, pursuant to the outcome of the Uruguay Round multilateral trade negotiations, the criteria whereby the Commission fixes the standard values for imports from third countries, in respect of the products and periods stipulated in Annex XVI, Part A thereto.

(2)   The standard import value is calculated each working day, in accordance with Article 136(1) of Implementing Regulation (EU) No 543/2011, taking into account variable daily data. Therefore this Regulation should enter into force on the day of its publication in the *Official Journal of the European Union*,

HAS ADOPTED THIS REGULATION:

Article 1

The standard import values referred to in Article 136 of Implementing Regulation (EU) No 543/2011 are fixed in the Annex to this Regulation.

Article 2

This Regulation shall enter into force on the day of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 17 August 2015.

For the Commission,
On behalf of the President,
Jerzy PLEWA
Director-General for Agriculture and Rural Development

_____

(^{1}) OJ L 347, 20.12.2013, p. 671.
(^{2}) OJ L 157, 15.6.2011, p. 1.

ANNEX

Standard import values for determining the entry price of certain fruit and vegetables

(EUR/100 kg)

CN code	Third country code (¹)	Standard import value
0702 00 00	MA	153,0
	MK	51,2
	ZZ	102,1
0709 93 10	TR	128,9
	ZZ	128,9
0805 50 10	AR	150,8
	CL	160,0
	UY	130,5
	ZA	153,3
	ZZ	148,7
0806 10 10	EG	256,6
	IL	390,7
	TR	157,9
	US	339,9
	ZZ	286,3
0808 10 80	AR	102,5
	BR	99,6
	CL	135,9
	NZ	135,6
	US	145,7
	ZA	122,1
	ZZ	123,6
0808 30 90	AR	89,6
	CL	155,2
	NZ	146,7
	TR	140,6
	ZA	117,0
	ZZ	129,8
0809 30 10, 0809 30 90	MK	64,9
	TR	130,9
	ZZ	97,9
0809 40 05	BA	48,2
	IL	99,6
	MK	36,8
	XS	57,7
	ZZ	60,6

(¹) Nomenclature of countries laid down by Commission Regulation (EU) No 1106/2012 of 27 November 2012 implementing Regulation (EC) No 471/2009 of the European Parliament and of the Council on Community statistics relating to external trade with non-member countries, as regards the update of the nomenclature of countries and territories (OJ L 328, 28.11.2012, p. 7). Code 'ZZ' stands for 'of other origin'.

DECISIONS

COUNCIL IMPLEMENTING DECISION (EU) 2015/1401

of 14 July 2015

authorising Italy to introduce a special measure derogating from Articles 206 and 226 of Directive 2006/112/EC on the common system of value added tax

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Council Directive 2006/112/EC of 28 November 2006 on the common system of value added tax (¹), and in particular Article 395(1) thereof,

Having regard to the proposal from the European Commission,

Whereas:

(1) By letter registered with the Commission on 24 November 2014, Italy requested authorisation to introduce a special measure derogating from Articles 206 and 226 of Directive 2006/112/EC in relation to value added tax (VAT) payment and invoicing arrangements.

(2) The Commission informed the other Member States of the request made by Italy by letter dated 16 March 2015. By letter dated 17 March 2015, the Commission notified Italy that it had all the information it considered necessary for appraisal of the request.

(3) Italy has detected substantial tax evasion with regard to supplies of goods and services to public authorities. On these supplies, VAT is paid by the public authority to the supplier who is, as a rule, liable for the payment of this VAT to the tax administration. However, Italy has indicated that a significant number of traders engage in tax evasion by not paying the VAT to the tax authorities.

(4) Italy requested the derogating measure in order to prevent VAT due on supplies to public authorities from being paid to the supplier, requiring instead for it to be paid to a separate and blocked bank account. This derogating measure should ensure that the opportunity to engage in that form of tax evasion is excluded without affecting the amount of VAT due. To that end, it is necessary to derogate for those supplies from Article 206 of Directive 2006/112/EC. In addition, it is also necessary to derogate from Article 226 of Directive 2006/112/EC as to allow for a special remark on the invoice that VAT has to be paid onto that special account.

(5) As a consequence of the measure, taxable persons, acting as suppliers to public authorities, might have to request more often a refund of VAT from the tax administration. Italy has indicated that it has taken the necessary legislative and administrative steps to speed up the refund procedure as to the guarantee that the right of deduction of the taxable persons concerned is fully respected. Italy should therefore be required to submit a report to the Commission within 18 months after the entry into force of the derogating measure in Italy regarding the overall situation of, and in particular the average time needed for, VAT refunds to taxable persons. In 2014, Italy introduced an obligation on public authorities to perform electronic invoicing for supplies of goods and services. That should allow for a proper control of the sector concerned in the future when an adequate control policy will have been developed and deployed on the basis of electronically available data. Once this system is fully implemented, there should be no further need to derogate from Directive 2006/112/EC. Therefore, Italy has offered assurance not to seek renewal of the authorisation of the derogating measure.

(¹) OJ L 347, 11.12.2006, p. 1.

(6)   The derogating measure is therefore proportionate to the objectives pursued since it is limited in time and restricted to a sector which poses considerable problems of tax evasion. In addition, the derogating measure does not give rise to the risk that tax evasion would shift to other sectors or other Member States.

(7)   In order to ensure that the objectives pursued by the measure are achieved and that its application does not create legal uncertainty with regard to the tax period, it is appropriate that this Decision applies from 1 January 2015.

(8)   The derogation will not negatively affect the overall amount of tax revenue collected at the stage of final consumption and will have no adverse impact on the Union's own resources accruing from VAT,

HAS ADOPTED THIS DECISION:

Article 1

By way of derogation from Article 206 of Directive 2006/112/EC, Italy is authorised to provide that the VAT due on supplies of goods and services to public authorities has to be paid by the recipient to a separate and blocked bank account of the tax administration.

Article 2

By way of derogation from Article 226 of Directive 2006/112/EC, Italy is authorised to require that invoices, issued in relation to supplies of goods and services to public authorities, include a special remark that VAT has to be paid to that separate and blocked bank account of the tax administration.

Article 3

Italy shall notify the national measures, referred to in Articles 1 and 2, to the Commission.

Within 18 months after the entry into force in Italy of the measures referred to in Articles 1 and 2, Italy shall submit a report to the Commission on the overall situation of VAT refunds to taxable persons affected by these measures and, in particular, on the average duration of the refund procedure.

Article 4

This Decision shall apply from 1 January 2015 to 31 December 2017.

Article 5

This Decision is addressed to the Italian Republic.

Done at Brussels, 14 July 2015.

For the Council
The President
P. GRAMEGNA

COMMISSION DECISION (EU) 2015/1402

of 15 July 2015

determining the European Union position with regard to a decision of the management entities under the Agreement between the Government of the United States of America and the European Union on the coordination of energy-efficiency labelling programmes for office equipment on the revision of specifications for computers included in Annex C to the Agreement

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Council Decision 2013/107/EU of 13 November 2012 on the signing and conclusion of the Agreement between the Government of the United States of America and the European Union on the coordination of energy-efficiency labelling programmes for office equipment [1], and in particular Article 4 thereof,

Whereas:

(1) The Agreement allows the European Commission, together with the United States Environmental Protection Agency, to develop and periodically revise common specifications for office equipment, thereby amending Annex C to the Agreement.

(2) The position of the European Union with regard to the amendment of the specifications is to be determined by the Commission.

(3) The measures provided for in this Decision take account of the opinion given by the European Union Energy Star Board referred to in Article 8 of Regulation (EC) No 106/2008 of the European Parliament and of the Council [2].

(4) The specification for computers given in Part I of Annex C should be repealed and replaced by the specifications annexed to this Decision,

HAS ADOPTED THIS DECISION:

Sole Article

The position to be adopted by the European Union with regard to a decision to be taken by the management entities under the Agreement between the Government of the United States of America and the European Union on the coordination of energy-efficiency labelling programmes for office equipment on revising the specifications for computers given in Part I of Annex C to the Agreement shall be based on the attached draft decision.

This Decision shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

Done at Brussels, 15 July 2015.

For the Commission
The President
Jean-Claude JUNCKER

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[1] OJ L 63, 6.3.2013, p. 5.
[2] Regulation (EC) No 106/2008 of the European Parliament and of the Council of 15 January 2008 on a Community energy-efficiency labelling programme for office equipment (OJ L 39, 13.2.2008, p. 1).

ANNEX

DRAFT DECISION

of …

the Management entities under the Agreement between the Government of the United States of America and the European Union on the coordination of energy-efficiency labelling programmes for office equipment on the revision of specifications for computers included in Annex C of the Agreement

THE MANAGEMENT ENTITIES,

Having regard to the Agreement between the Government of the United States and the European Union on the coordination of energy-efficiency labelling programmes for office equipment, and in particular Article XII thereof,

Whereas specifications for 'computers' should be revised,

HAVE DECIDED AS FOLLOWS:

Part I 'Computers' currently included in Annex C of the Agreement between the Government of the United States and the European Union on the coordination of energy-efficiency labelling programmes for office equipment shall be replaced by Part V 'Computers' as laid down thereafter.

The Decision shall enter into force on the twentieth day following its publication. The Decision, done in duplicate, shall be signed by the Co-chairs.

Signed in Washington DC on the […] […]   Signed in Brussels on the […] […]

on behalf of the United States Environmental   *on behalf of the European Union*
Protection Agency

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ANNEX

ANNEX C

PART II TO THE AGREEMENT

'V. COMPUTER SPECIFICATIONS (VERSION 6.1)

1. **Definitions**

A. Product Types:

1. Computer: A device which performs logical operations and processes data. For the purposes of this specification, computers include both stationary and portable units, including Desktop Computers, Integrated Desktop Computers, Notebook Computers, Small-Scale Servers, Thin Clients, and Workstations. Although computers are capable of using input devices and displays, such devices are not required to be included with the computer upon shipment. Computers are composed of, at a minimum:

   a) A central processing unit (CPU) to perform operations. If no CPU is present, then the device must function as a client gateway to a server which acts as a computational CPU;

   b) User input devices such as a keyboard, mouse, or touchpad; and

   c) An Integrated Display screen and/or the ability to support an external display screen to output information.

2. Desktop Computer: A computer whose main unit is designed to be located in a permanent location, often on a desk or on the floor. Desktop computers are not designed for portability and are designed for use with an external display, keyboard, and mouse. Desktop computers are intended for a broad range of home and office applications, including point of sale applications.

   a) Integrated Desktop Computer: A Desktop Computer in which the computing hardware and display are integrated into a single housing, and which is connected to ac mains power through a single cable. Integrated Desktop Computers come in one of two possible forms: (1) a system where the display and computer are physically combined into a single unit; or (2) a system packaged as a single system where the display is separate but is connected to the main chassis by a dc power cord and both the computer and display are powered from a single power supply. As a subset of Desktop Computers, Integrated Desktop Computers are typically designed to provide similar functionality as Desktop systems.

3. Notebook Computer: A computer designed specifically for portability and to be operated for extended periods of time both with and without a direct connection to an ac mains power source. Notebook Computers include an Integrated Display, a non-detachable, mechanical keyboard (using physical, moveable keys), and pointing device.

   Note: Notebook computers are typically designed to provide similar functionality to Desktops, including operation of software similar in functionality as that used in Desktops. For purposes of this specification, Notebook Computers include models with touch-sensitive screens.

   a) Mobile Thin Client: A computer meeting the definition of a Thin Client, designed specifically for portability, and also meeting the definition of a Notebook Computer. These products are considered to be Notebook Computers for the purposes of this specification.

   b) Two-In-One Notebook: A computer which resembles a traditional Notebook Computer with a clam shell form factor, but has a detachable display which can act as an independent Slate/Tablet when disconnected. The keyboard and display portions of the product must be shipped as an integrated unit. Two-In-One Notebooks are considered Notebooks in the remainder of this specification and are therefore not referenced explicitly.

4. Slate/Tablet: A computing device designed for portability that meets all of the following criteria:

   a) Includes an integrated display with a diagonal size greater than 6,5 inches and less than 17,4 inches;

   b) Lacking an integrated, physical attached keyboard in its as-shipped configuration;

c) Includes and primarily relies on touchscreen input; (with optional keyboard);

d) Includes and primarily relies on a wireless network connection (e.g., Wi-Fi, 3G, LTE, etc.); and

e) Includes and is primarily powered by an internal battery (with connection to the mains for battery charging, not primary powering of the device).

5. Portable All-In-One Computer: A computing device designed for limited portability that meets all of the following criteria:

   a) Includes an integrated display with a diagonal size greater than or equal to 17,4 inches;

   b) Lacking keyboard integrated into the physical housing of the product in its as-shipped configuration;

   c) Includes and primarily relies on touchscreen input; (with optional keyboard);

   d) Includes wireless network connection (e.g. Wi-Fi, 3G, LTE, etc.); and

   e) Includes an internal battery, but is primarily powered by connection to the ac mains.

6. E-Reader: A device designed for display and consumption of static images. The display is characterized by a low refresh rate and a display made of bistable materials where no energy is needed to maintain a visible image, only to alter the image.

7. Small-scale Server: A computer that typically uses desktop components in a desktop form factor, but is designed primarily to be a storage host for other computers. Small-scale Servers are designed to perform functions such as providing network infrastructure services (e.g., archiving) and hosting data/media. These products are not designed to process information for other systems or run web servers as a primary function. A Small-scale Server has the following characteristics:

   a) Designed in a pedestal, tower, or other form factor similar to those of desktop computers such that all data processing, storage, and network interfacing is contained within one box/product;

   b) Designed to operate 24 hours/day, 7 days/week, with minimal unscheduled downtime (on the order of hours/year);

   c) Capable of operating in a simultaneous multi-user environment serving several users through networked client units; and

   d) Designed for an industry accepted operating system for home or low-end server applications (e.g., Windows Home Server, Mac OS X Server, Linux, UNIX, Solaris).

8. Thin Client: An independently-powered computer that relies on a connection to remote computing resources (e.g., computer server, remote workstation) to obtain primary functionality. Main computing functions (e.g., program execution, data storage, interaction with other internet resources) are provided by the remote computing resources. Thin Clients covered by this specification are (1) limited to devices with no rotational storage media integral to the computer and (2) designed for use in a permanent location (e.g. on a desk) and not for portability.

   a) Integrated Thin Client: A Thin Client in which computing hardware and display are connected to ac mains power through a single cable. Integrated Thin Client computers come in one of two possible forms: (1) a system where the display and computer are physically combined into a single unit; or (2) a system packaged as a single system where the display is separate but is connected to the main chassis by a dc power cord and both the computer and display are powered from a single power supply. As a subset of Thin Clients, Integrated Thin Clients are typically designed to provide similar functionality as Thin Client systems.

   b) Ultra-thin Client: A computer with lesser local resources than a standard Thin Client that sends raw mouse and keyboard input to a remote computing resource and receives back raw video from the remote computing resource. Ultra-thin clients cannot interface with multiple devices simultaneously nor run windowed remote applications due to the lack of a user-discernible client operating system on the device (i.e., beneath firmware, user inaccessible).

9. Workstation: A high-performance, single-user computer typically used for graphics, CAD, software development, financial and scientific applications among other compute intensive tasks. Workstations covered by this specification (a) are marketed as a workstation; (b) provide mean time between failures (MTBF) of at least 15 000 hours (based on either Bellcore TR-NWT-000332, issue 6, 12/97 or field collected data); and (c) support error-correcting code (ECC) and/or buffered memory. In addition, a workstation meets three or more of the following criteria:

a) Provide supplemental power support for high-end graphics (e.g., PCI-E 6-pin 12V supplemental power feed);

b) Wired for greater than x4 PCI-E on the motherboard in addition to the graphics slot(s) and/or PCI-X support;

c) Do not provide support for Uniform Memory Access (UMA) graphics;

d) Provide 5 or more PCI, PCI-E, or PCI-X slots;

e) Provide multi-processor support for 2 or more processors (shall support physically separate processor packages/sockets, i.e., requirement cannot be met with support for a single multi-core processor); and/or

f) Qualification by 2 or more Independent Software Vendor (ISV) product certifications; these certifications can be in process, but shall be completed within 3 months of qualification.

B. Product Category: A second-order classification or sub-type within a product type that is based on product features and installed components. Product categories are used in this specification to determine qualification and test requirements.

C. Computer Components:

1. Graphics Processing Unit (GPU): An integrated circuit, separate from the CPU, designed to accelerate the rendering of either 2D and/or 3D content to displays. A GPU may be mated with a CPU, on the system board of the computer or elsewhere to offload display capabilities from the CPU.

2. Discrete Graphics (dGfx): A graphics processor (GPU) with a local memory controller interface and local graphics-specific memory.

3. Integrated Graphics (iGfx): A graphics solution that does not contain Discrete Graphics.

4. Display: 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 (1) a computer, workstation or server via one or more inputs (e.g., VGA, DVI, HDMI, DisplayPort, IEEE 1394, USB), (2) external storage (e.g., USB flash drive, memory card), or (3) a network connection.

a) Enhanced-performance Integrated Display: An integrated Computer Display that has all of the following features and functionalities:

(1) A contrast ratio of at least 60:1 at a horizontal viewing angle of at least 85°, with or without a screen cover glass;

(2) A native resolution greater than or equal to 2,3 megapixels (MP); and

(3) A colour gamut of at least sRGB as defined by European Standard EN 61966-2-1 (identical with IEC 61966-2-1). Shifts in colour space are allowable as long as 99 % or more of defined sRGB colours are supported.

5. External Power Supply (EPS): Also referred to as External Power Adapter. An external power supply circuit that is used to convert household electric current into dc current or lower-voltage ac current to operate a consumer product.

6. Internal Power Supply (IPS): A component internal to the computer casing and designed to convert ac voltage from the mains to dc voltage(s) for the purpose of powering the computer components. For the purposes of this specification, an internal power supply shall be contained within the computer casing but be separate from the main computer board. The power supply shall connect to the mains through a single cable with no intermediate circuitry between the power supply and the mains power. In addition, all power connections from the power supply to the computer components, with the exception of a DC connection to a display in an Integrated Desktop Computer, shall be internal to the computer casing (i.e., no external cables running from the power supply to the computer or individual components). Internal dc-to-dc converters used to convert a single dc voltage from an external power supply into multiple voltages for use by the computer are not considered internal power supplies.

D. Operational Modes:

1. Active State: The power state in which the computer is carrying out useful work in response to a) prior or concurrent user input or b) prior or concurrent instruction over the network. Active State includes active processing, seeking data from storage, memory, or cache, including Idle State time while awaiting further user input and before entering low power modes.

2. Idle State: The power state in which the operating system and other software have completed loading, a user profile has been created, activity is limited to those basic applications that the system starts by default, and the computer is not in Sleep Mode. Idle State is composed of two sub-states: Short Idle and Long Idle.

   a) Long Idle: The mode where the Computer has reached an Idle condition (i.e., 15 minutes after OS boot or after completing an active workload or after resuming from Sleep Mode) and the main Computer Display has entered a low-power state where screen contents cannot be observed (i.e., backlight has been turned off) but remains in the working mode (ACPI G0/S0). If power management features are enabled as-shipped in the scenario described in this definition, such features shall engage prior to evaluation of Long Idle (e.g., display is in a low power state, HDD may have spun-down), but the Computer is prevented from entering Sleep Mode. P_{LONG_IDLE} represents the average power measured when in the Long Idle Mode.

   b) Short Idle: The mode where the Computer has reached an Idle condition (i.e., 5 minutes after OS boot or after completing an active workload or after resuming from Sleep Mode), the screen is on, and Long Idle power management features have not engaged (e.g. HDD is spinning and the Computer is prevented from entering sleep mode). P_{SHORT_IDLE} represents the average power measured when in the Short Idle mode.

3. Off Mode: The lowest power mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the appliance is connected to the main electricity supply and used in accordance with the manufacturer's instructions. For systems where ACPI standards are applicable, Off Mode correlates to ACPI System Level S5 state.

4. Sleep Mode: A low power mode that the computer enters automatically after a period of inactivity or by manual selection. A computer with Sleep capability can quickly "wake" in response to network connections or user interface devices with a latency of less than or equal to 5 seconds from initiation of wake event to system becoming fully usable including rendering of display. For systems where ACPI standards are applicable, Sleep Mode most commonly correlates to ACPI System Level S3 (suspend to RAM) state.

E. Networking and Additional Capabilities:

1. Additional Internal Storage: Any and all internal hard disk drives (HDD) or solid state drives (SSD) shipping with a computer beyond the first. This definition does not include external drives.

2. Energy Efficient Ethernet (EEE): A technology which enables reduced power consumption of Ethernet interfaces during times of low data throughput. Specified by IEEE 802.3az.

3. Full Network Connectivity: The ability of the computer to maintain network presence while in Sleep Mode or an alternative low power mode (LPM) with power less than or equal to 10 watts and intelligently wake when further processing is required (including occasional processing required to maintain network presence). Presence of the computer, its network services and applications, is maintained even though the computer is in a LPM. From the

vantage point of the network, a computer with full network connectivity that is in LPM is functionally equivalent to an idle computer with respect to common applications and usage models. Full network connectivity in LPM is not limited to a specific set of protocols but can cover applications installed after initial installation. Also referred to as "network proxy" functionality and as described in the *Ecma-393* standard.

a) Network Proxy — Base Capability: To maintain addresses and presence on the network while in LPM, the system handles IPv4 ARP and IPv6 NS/ND.

b) Network Proxy — Full Capability: While in LPM, the system supports Base Capability, Remote Wake, and Service Discovery/Name Services.

c) Network Proxy — Remote Wake: While in LPM, the system is capable of remotely waking upon request from outside the local network. Includes Base Capability.

d) Network Proxy — Service Discovery/Name Services: While in LPM, the system allows for advertising host services and network name. Includes Base Capability.

4. Network Interface: The components (hardware and software) whose primary function is to make the computer capable of communicating over one or more network technologies. Examples of Network Interfaces are IEEE 802.3 (Ethernet) and IEEE 802.11 (Wi-Fi).

5. Wake Event: A user, scheduled, or external event or stimulus that causes the computer to transition from Sleep Mode or Off Mode to an active state of operation. Examples of wake events include, but are not limited to: movement of the mouse, keyboard activity, controller input, real-time clock event, or a button press on the chassis, and in the case of external events, stimulus conveyed via a remote control, network, modem, etc.

6. Wake On LAN (WOL): Functionality which allows a computer to transition from Sleep Mode or Off Mode to an Active State of operation when directed by a network Wake Event via Ethernet.

7. Switchable Graphics: Functionality that allows Discrete Graphics to be disabled when not required in favour of Integrated Graphics.

Note: This functionality allows lower power and lower capability integrated GPUs to render the display while on battery or when the output graphics are not overly complex while then allowing the more power consumptive but more capable discrete GPU to provide rendering capability when the user requires it.

F. Marketing and Shipment Channels:

1. Enterprise Channels: Sales channels typically used by large and medium-sized business, government, educational, or other organizations to purchase computers for use in managed client/server environments.

2. Model Name: A marketing name that includes reference to the computer model number, product description, or other branding references.

3. Model Number: A unique marketing name or identification reference that applies to a specific hardware and software configuration (e.g., operating system, processor type, memory, GPU), and is either pre-defined or selected by a customer.

G. Product Family: A high-level description referring to a group of computers sharing one chassis/motherboard combination that often contains hundreds of possible hardware and software configurations. Product models within a family differ from each other according to one or more characteristics or features that either (1) have no impact on product performance with regard to ENERGY STAR qualification criteria, or (2) are specified herein as acceptable variations within a product family. For Computers, acceptable variations within a product family include:

1. Colour;

2. Housing; and

3. Electronic components other than the chassis/motherboard, such as the processor, memory, GPU, etc.

2. **Scope**

2.1. *Included Products*

2.1.1. Products that meet the definition of a Computer and one of the following Product Type definitions, as specified herein, are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.2:

(i) Desktop Computers and Integrated Desktop Computers;

(ii) Notebook Computers;

(iii) Slates/Tablets;

(iv) Portable All-In-One Computers;

(v) Workstations;

(vi) Small-scale Servers that are marketed and sold for non-data centre use; and

(vii) Thin Clients.

2.2. *Excluded Products*

2.2.1. Products that are covered under other ENERGY STAR product specifications are not eligible for qualification under this specification. The list of specifications currently in effect can be found at www.energystar.gov/products.

2.2.2. The following products are not eligible for qualification under this specification:

(i) Docking Stations;

(ii) Game Consoles;

(iii) E-Readers;

(iv) Handheld gaming devices, typically battery powered and intended for use with an integral display as the primary display;

(v) Mobile Thin Clients not meeting the definition of Notebook Computer;

(vi) Personal Digital Assistant devices (PDAs);

(vii) Point of Sale (POS) products that do not use internal components common to Notebook, Desktop, or Integrated Desktop Computers, including processor, motherboard, and memory;

(viii) Small-scale Servers that are marketed and sold for use in data centres;

(ix) Handheld Computers which contain cellular voice capability;

(x) Ultra-thin Clients.

3. **Qualification Criteria**

3.1. *Significant Digits and Rounding*

3.1.1. All calculations shall be carried out with directly measured (unrounded) values.

3.1.2. Unless otherwise specified in this specification, compliance with specification limits shall be evaluated using directly measured or calculated values without any benefit from rounding.

3.1.3. Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

3.2. *General Requirements*

3.2.1. Internal Power Supply (IPS) Requirements: IPSs used in Computers eligible under this specification must meet the following requirements when tested using the Generalized Internal Power Supply Efficiency Test Protocol, Rev. 6.6 (available at http://www.plugloadsolutions.com/docs/collatrl/print/Generalized_Internal_Power_Supply_Efficiency_Test_Protocol_R6.6.pdf) and tested at the relevant input voltage/frequency combination for each market in which they will be sold and promoted as ENERGY STAR..

(i) IPS with maximum rated output power less than 75 watts shall meet minimum efficiency requirements as specified in Table 1.

(ii) IPS with maximum rated output power greater than or equal to 75 watts shall meet both minimum efficiency requirements and minimum power factor requirements, as specified in Table 1.

Table 1

Requirements for Internal Power Supplies

Loading Condition (Percentage of Nameplate Output Current)	Minimum Efficiency	Minimum Power Factor
20 %	0,82	—
50 %	0,85	—
100 %	0,82	0,90

3.2.2. External Power Supply (EPS) Requirements: Single- and Multiple-voltage EPSs shall meet the Level V or greater performance requirements under the International Efficiency Marking Protocol when tested according to the Uniform Test Method for Measuring the Energy Consumption of External Power Supplies, Appendix Z to 10 CFR Part 430.

— Single-voltage EPSs shall include the Level V (or greater) marking.

— Additional information on the Marking Protocol is available at www.energystar.gov/powersupplies

3.3. *Power Management Requirements*

3.3.1. Products shall include power management features in their "as-shipped" condition as specified in Table 2, subject to the following conditions:

(i) For Thin Clients, the Wake-on-LAN (WOL) requirement shall apply for products designed to receive software updates from a centrally managed network while in Sleep Mode or in Off Mode. Thin Clients whose standard software upgrade framework does not require off-hours scheduling are exempt from the WOL requirement.

(ii) For Notebooks, WOL may be automatically disabled when the product is disconnected from ac mains power.

(iii) For all products with WOL, directed packet filters shall be enabled and set to an industry standard default configuration.

(iv) Products that do not support Sleep Mode by default are only subject to the Display Sleep Mode requirement.

Table 2

Power Management Requirements

Mode or Mode Transition	Requirement	Desktops	Integrated Desktops	Portable All-In-Ones	Notebooks	Small-scale Servers	Slates/Tablets	Thin Clients	Workstations
System Sleep Mode (¹)	(1) Sleep Mode shall be set to activate after no more than 30 minutes of user inactivity. (2) The speed of any active 1 Gb/s Ethernet network links shall be reduced when transitioning to Sleep Mode or Off Mode.	Yes	Yes	Yes	Yes	No	N/A	Yes	Yes
Display Sleep Mode	Display Sleep Mode shall be set to activate after no more than 15 minutes of user inactivity.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wake on LAN (WOL) (¹)	(1) Computers with Ethernet capability shall provide users with an option to enable and disable WOL for Sleep Mode. (2) Computers with Ethernet capability that are shipped through enterprise channels shall either: (a) be shipped with WOL enabled by default for Sleep Mode, when the computer is operating on ac mains power; or (b) provide users with the ability to enable WOL that is accessible from both the client operating system user interface and over the network.	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes
Wake Management (¹)	Computers with Ethernet capability that are shipped through enterprise channels shall: (a) be capable of both remote (via network) and scheduled (via real-time clock) wake events from Sleep Mode, and (b) provide clients with the ability to centrally manage (via vendor tools) any wake management settings that are configured through hardware settings if the manufacturer has control over such features.	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes

(¹) Where Sleep Mode is supported by the UUT by default and Sleep Mode power is used as part of the TEC equation for qualification.

3.4. *User Information Requirements*

3.4.1. Products shall be shipped with informational materials to notify customers of the following:

(i) A description of power management settings that have been enabled by default,

(ii) A description of the timing settings for various power management features, and

(iii) Instructions for properly waking the product from Sleep Mode.

3.4.2. Products shall be shipped with one or more of the following:

(i) A list of default power management settings.

(ii) A note stating that default power management settings have been selected for compliance with ENERGY STAR (within 15 min of user inactivity for the display, within 30 min for the computer, if applicable per Table 2), and are recommended by the ENERGY STAR program for optimal energy savings.

(iii) Information about ENERGY STAR and the benefits of power management, to be located at or near the beginning of the hard copy or electronic user manual, or in a package or box insert.

3.4.3. Provisions 3.4.1 and 3.4.2 may be met through use of either electronic or printed product documentation, provided it adheres to all of the following:

(i) Documentation is shipped with the product (e.g., in a printed manual or insert, on included optical media, in a file installed with the software load shipped to the customer) or available electronically on the manufacturer's website. In the latter case, instructions for accessing the information on the website shall be provided in the product package or on the Desktop or home screen; and

(ii) Documentation is included either (a) only with ENERGY STAR qualified Computers; or (b) as part of the standard documentation if and only if accompanied by EPA-approved customer guidance on how to identify if their computer configuration is ENERGY STAR qualified.

3.5. *Requirements for Desktop, Integrated Desktop, and Notebook Computers*

3.5.1. Calculated Typical Energy Consumption (E_{TEC}) for Desktop, Integrated Desktop, and Notebook Computers per Equation 1 shall be less than or equal to the maximum TEC requirement (E_{TEC_MAX}) per Equation 2, subject to the following requirements:

(i) The Additional Internal Storage adder allowance ($TEC_{STORAGE}$) shall be applied if there are more than one internal storage devices present in the product, in which case it shall only be applied once.

(ii) The Integrated Display adder allowance ($TEC_{INT\_DISPLAY}$) applies only for Integrated Desktops and Notebooks and may be applied for each display. For Enhanced-performance Integrated Displays, the adder is calculated as presented in Table 7 and Equation 3.

(iii) For a product to qualify for the Full Network Connectivity mode weightings, the following criteria shall be satisfied:

— Products shall meet a non-proprietary Full Network Connectivity standard such as ECMA 393 or another standard that has been approved by EPA or the European Commission as meeting the goals of ENERGY STAR. Such approval must be in place prior to submittal of product data for qualification.

— Products shall have the applied level of functionality enabled and configured by default upon shipment. If Full Network Connectivity features are not enabled by default, the system shall be tested and reported with Conventional TEC weightings.

— Products shall be capable of Sleep Mode or alternative low power modes with power less than or equal to 10 watts.

— *Note:* Full Network Connectivity is a manufacturer-reported parameter. On Mac computers, "Wake for network access" enabled within the Energy Saver/Power Adapter Preferences signifies Base Capability or better. On Windows computers, "ARP Offload" or "NS Offload" or similar enabled within the Advanced Properties of the Network Interface Card (accessed through the Device Manager) signifies Base Capability or better. For systems with a dual Network Interface Card (NIC) configuration, only one NIC configuration needs to comply. The manufacturer can provide further guidance on how to confirm Proxy Support.

(iv) For Notebooks, Desktops, and Integrated Desktops that use an alternative low power mode in place of System Sleep Mode, power in Long Idle (P_{LONG_IDLE}) may be used in place of power in Sleep (P_{SLEEP}) in Equation 1 if the alternative low power mode is less than or equal to 10 watts. In such instances, ($P_{SLEEP} \times T_{SLEEP}$), is replaced by ($P_{LONG\_IDLE} \times T_{SLEEP}$); Equation 1 remains otherwise unchanged.

(v) Notebooks, Desktops, and Integrated Desktops with switchable graphics may not apply the Discrete Graphics allowance, $TEC_{GRAPHICS}$, from Table 7 in Equation 2. However, for Desktop and Integrated Desktop systems providing Switchable Graphics and enabling it by default, an allowance equal to 50 % of the G1 graphics allowance for the platform type (Desktop or Integrated Desktop) may be applied. The switchable graphics incentive only applies to automated switching that is enabled by default. This capability is manufacturer-declared.

Equation 1: TEC Calculation (E_{TEC}) for Desktop, Integrated Desktop, Thin Client and Notebook Computers

$$E_{TEC} = \frac{8\,760}{1\,000} \times (P_{OFF} \times T_{OFF} + P_{SLEEP} \times T_{SLEEP} + P_{LONG\_IDLE} \times T_{LONG\_IDLE} + P_{SHORT\_IDLE} \times T_{SHORT\_IDLE})$$

Where:

— P_{OFF} = Measured power consumption in Off Mode (W);

— P_{SLEEP} = Measured power consumption in Sleep Mode (W);

— P_{LONG_IDLE} = Measured power consumption in Long Idle Mode (W);

— P_{SHORT_IDLE} = Measured power consumption in Short Idle Mode (W); and

— T_{OFF}, T_{SLEEP}, T_{LONG_IDLE}, and T_{SHORT_IDLE} are mode weightings as specified in Table 3 (for Desktops, Integrated Desktops, and Thin Clients) or Table 4 (for Notebooks).

Table 3

Mode Weightings for Desktop, Thin Clients, and Integrated Desktop Computers

Mode Weighting	Conventional (%)	Full Network Connectivity			
		Base Capability (%)	Remote Wake (%)	Service Discovery/ Name Services (%)	Full Capability (%)
T_{OFF}	45	40	30	25	20
T_{SLEEP}	5	15	28	36	45
T_{LONG_IDLE}	15	12	10	8	5
T_{SHORT_IDLE}	35	33	32	31	30

Table 4

Mode Weightings for Notebook Computers

Mode Weighting	Conventional (%)	Full Network Connectivity			
		Base Capability (%)	Remote Wake (%)	Service Discovery/ Name Services (%)	Full Capability (%)
T_{OFF}	25	25	25	25	25
T_{SLEEP}	35	39	41	43	45

Mode Weighting	Conventional (%)	Full Network Connectivity			
		Base Capability (%)	Remote Wake (%)	Service Discovery/ Name Services (%)	Full Capability (%)
T_{LONG_IDLE}	10	8	7	6	5
T_{SHORT_IDLE}	30	28	27	26	25

Equation 2: E_{TEC_MAX} Calculation for Desktop, Integrated Desktop, and Notebook Computers

$$E_{TEC\_MAX} = (1 + ALLOWANCE_{PSU}) \times (TEC_{BASE} + TEC_{MEMORY} + TEC_{GRAPHICS} + TEC_{STORAGE} + TEC_{INT\_DISPLAY} + TEC_{SWITCHABLE} + TEC_{EEE})$$

Where:

— *ALLOWANCE*$_{PSU}$ is an allowance provided to power supplies that meet the optional more stringent efficiency levels specified in Table 5; power supplies that do not meet the requirements receive an allowance of 0;

— *TEC*$_{BASE}$ is the Base allowance specified in Table 6; and,

— *TEC*$_{GRAPHICS}$ is the discrete graphics allowance as specified in Table 7, with the exception of systems with integrated graphics, which do not receive an allowance, or Desktops and Integrated Desktops with switchable graphics enabled by default, which receive an allowance through TEC$_{SWITCHABLE}$; and

— *TEC*$_{MEMORY}$, *TEC*$_{STORAGE}$, *TEC*$_{INT\_DISPLAY}$, *TEC*$_{SWITCHABLE}$, and *TEC*$_{EEE}$ are adder allowances as specified in Table 7.

Table 5

Power Supply Efficiency Allowance

Power Supply Type	Computer Type	Minimum Efficiency at Specified Proportion of Rated Output Current (1)				Minimum Average Efficiency (2)	Allowance$_{PSU}$
		10 %	20 %	50 %	100 %		
IPS	Desktop	0,81	0,85	0,88	0,85	—	0,015
		0,84	0,87	0,90	0,87	—	0,03
	Integrated Desktop	0,81	0,85	0,88	0,85	—	0,015
		0,84	0,87	0,90	0,87	—	0,04
EPS	Notebook or Desktop	0,83	—	—	—	0,88	0,015
		0,84	—	—	—	0,89	0,03
	Integrated Desktop	0,83	—	—	—	0,88	0,015
		0,84	—	—	—	0,89	0,04

(1) EPSs shall meet the specified requirements when tested using the Uniform Test Method for Measuring the Energy Consumption of External Power Supplies, Appendix Z to 10 CFR Part 430. IPSs shall meet the specified requirements when tested using the EPRI 306 Generalized Internal Power Supply Efficiency Test Protocol, Rev. 6.6.
(2) Average efficiency is the arithmetic mean of efficiencies tested at 25 %, 50 %, 75 %, and 100 % of rated output current. EPSs shall meet the specified requirements when tested using the Uniform Test Method for Measuring the Energy Consumption of External Power Supplies, Appendix Z to 10 CFR Part 430.

Table 6

Base TEC (TEC_BASE) Allowances

Cat-egory Name	Graphics Capability (1)	Desktop or Integrated Desktop		Notebook	
		Performance Score, P (2)	Base Allowance	Performance Score, P^v	Base Allowance
0	Any Graphics dGfx ≤ G7	$P \leq 3$	69,0	$P \leq 2$	14,0
I1	Integrated or Switchable Graphics	$3 < P \leq 6$	112,0	$2 < P \leq 5,2$	22,0
I2		$6 < P \leq 7$	120,0	$5,2 < P \leq 8$	24,0
I3		$P > 7$	135,0	$P > 8$	28,0
D1	Discrete Graphics dGfx ≤ G7	$3 < P \leq 9$	115,0	$2 < P \leq 9$	16,0
D2		$P > 9$	135,0	$P > 9$	18,0

(1) Discrete Graphics capability is categorized based on frame buffer bandwidth, as shown in Table 7.
(2) P = [# of CPU cores] × [CPU clock speed (GHz)], where # of cores represents the number of physical CPU cores and CPU clock speed represents the Max TDP core frequency, not the turbo boost frequency.

Table 7

Functional Adder Allowances for Desktop, Integrated Desktop, Thin Client, and Notebook Computers

Function			Desktop	Integrated Desktop	Notebook
TEC_MEMORY (kWh) (1)				0,8	
TEC_GRAPHICS (kWh) (2)	Graphics Category (3)	G1 (FB_BW ≤ 16)		36	14
		G2 (16< FB_BW ≤ 32)		51	20
		G3 (32 < FB_BW ≤ 64)		64	26
		G4 (64 < FB_BW ≤ 96)		83	32
		G5 (96 < FB_BW ≤ 128)		105	42
		G6 (FB_BW > 128; Frame Buffer Data Width < 192 bits)		115	48
		G7 (FB_BW > 128; Frame Buffer Data Width ≥ 192 bits		130	60

Function	Desktop	Integrated Desktop	Notebook
$TEC_{SWITCHABLE}$ (kWh) [4]	0,5 × G1		N/A
TEC_{EEE} (kWh) [5]	8,76 × 0,2 × (0,15 + 0,35)		8,76 × 0,2 × (0,10 + 0,30)
$TEC_{STORAGE}$ (kWh) [6]	26		2,6
$TEC_{INT\_DISPLAY}$ (kWh) [7]	N/A	8,76 × 0,35 × (1 + EP) × (4 × r + 0,05 × A)	8,76 × 0,30 × (1 + EP) × (2 × r + 0,02 × A)

[1] TEC_{MEMORY} Adder: Applies per GB installed in the system.
[2] $TEC_{GRAPHICS}$ Adder: Applies to only the first dGfx installed in the system, but not Switchable Graphics.
[3] FB_BW: Is the display frame buffer bandwidth in gigabytes per second (GB/s). This is a manufacturer declared parameter and should be calculated as follows: (Data Rate [Mhz] × Frame Buffer Data Width [bits])/(8 × 1 000)
[4] $TEC_{SWITCHABLE}$ Incentive: Applies to automated switching that is enabled by default in Desktops and Integrated Desktops.
[5] TEC_{EEE}: Applies per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.
[6] $TEC_{STORAGE}$ Adder: Applies once if system has more than one Additional Internal Storage element.
[7] $TEC_{INT\_DISPLAY}$ Adder: EP is the Enhanced Performance Display allowance calculated per Equation 3; r is the Screen resolution in megapixels; and A is viewable screen area in square inches.

Equation 3: Calculation of Allowance for Enhanced-performance Integrated Displays

$$EP = \begin{cases} 0, & \text{No Enhanced Performance Display} \\ 0,3, & \text{Enhanced Performance Display, } d < 27 \\ 0,75, & \text{Enhanced Performance Display, } d \geq 27 \end{cases}$$

Where:

— d is the diagonal of the screen, in inches;

3.6. *Requirements for Slates/Tablets and Portable All-In-One Computers*

3.6.1. Slates/Tablets shall follow all of the requirements for Notebook Computers in Section 3.5 above, including calculations of the following:

(i) Calculated Typical Energy Consumption (E_{TEC}), using Equation 1 with the Notebook Computer Mode Weightings from Table 4.

(ii) Calculated Maximum Allowed Typical Energy Consumption (E_{TEC_MAX}), using Equation 2 with the appropriate base Notebook Computer allowance from Table 6, and applicable Notebook Computer functional adder allowances from Table 7.

3.6.2. Portable All-In-One Computers shall follow all of the requirements for Integrated Desktop Computers in Section 3.5 above, including calculation of the following:

(i) Calculated Typical Energy Consumption (E_{TEC}), using Equation 1 with the Integrated Desktop Computer Mode Weightings from Table 3.

(ii) Calculated Maximum Allowed Typical Energy Consumption (E_{TEC_MAX}), using Equation 2 with the appropriate base Integrated Desktop Computer allowance from Table 6, and applicable Integrated Desktop Computer functional adder allowances from Table 7.

Note: EPA and the European Commission intend to further evaluate Slate/Tablet and Portable All-In-One Computer product data to inform the development of future energy consumption requirements.

3.7. *Requirements for Workstations*

3.7.1. Weighted power consumption (P_{TEC}) as calculated per Equation 4 shall be less than or equal to the maximum weighted power consumption requirement (P_{TEC_MAX}) as calculated per Equation 5.

Equation 4: P_{TEC} Calculation for Workstations

$$P_{TEC} = P_{OFF} \times T_{OFF} + P_{SLEEP} \times T_{SLEEP} + P_{LONG\_IDLE} \times T_{LONG\_IDLE} + P_{SHORT\_IDLE} \times T_{SHORT\_IDLE}$$

Where:

— P_{OFF} = Measured power consumption in Off Mode (W);

— P_{SLEEP} = Measured power consumption in Sleep Mode (W);

— P_{LONG_IDLE} = Measured power consumption in Long Idle Mode (W);

— P_{SHORT_IDLE} = Measured power consumption in Short Idle Mode (W); and

— T_{OFF}, T_{SLEEP}, T_{LONG_IDLE}, and T_{SHORT_IDLE} are mode weightings as specified in Table 8

Table 8

Mode Weightings for Workstations

T_{OFF}	T_{SLEEP}	T_{LONG_IDLE}	T_{SHORT_IDLE}
35 %	10 %	15 %	40 %

Equation 5: P_{TEC_MAX} Calculation for Workstations

$$P_{TEC\_MAX} = 0{,}28 \times (P_{MAX} + N_{HDD} \times 5) + 8{,}76 \times P_{EEE} \times (T_{SLEEP} + T_{LONG\_IDLE} + T_{SHORT\_IDLE})$$

Where:

— P_{MAX} = Measured maximum power consumption (W)

— N_{HDD} = Number of installed hard disk drives (HDD) or solid state drives (SSD)

— P_{EEE} is an EEE allowance of 0,2 W per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.

3.7.2. Active State Benchmark: To be ENERGY STAR qualified, a Workstation must be submitted for qualification with the following information disclosed in full:

(i) Linpack benchmark test results, compiler optimizations, and total energy consumed over the duration of the test; and

(ii) SPECviewperf benchmark test results, configuration options, total duration of the test, and total energy consumed over the duration of the test.

3.7.3. Desktop Workstations: Products marketed as workstations may be ENERGY STAR qualified under the Desktop requirements in Section 3.5 instead of the Workstation requirements in Section 3.6, at the Partner's option. EPA or the European Commission will identify Workstations qualified as Desktops as "Desktops" in all ENERGY STAR marketing materials, on qualified product lists, etc.

3.8. *Requirements for Small-scale Servers*

3.8.1. Measured Off Mode power (P_{OFF}) shall be less than or equal to the Maximum Off Mode Power Requirement (P_{OFF_MAX}), as calculated per Equation 6, subject to the following requirements:

(i) The Off Mode Wake-on-LAN (WOL) adder allowance (P_{OFF_WOL}) shall only be applied to products that offer WOL enabled by default upon shipment.

Equation 6: Calculation of P_{OFF_MAX} for Small-scale Servers

$$P_{OFF\_MAX} = P_{OFF\_BASE} + P_{OFF\_WOL}$$

Where:

— P_{OFF_BASE} is the base allowance as specified in Table 9; and

— P_{OFF_WOL} is the Wake-on-LAN allowance as specified in Table 9.

Table 9

Off Mode Power Allowances for Small-scale Servers

P_{OFF_BASE} (watts)	P_{OFF_WOL} (watts)
1,0	0,4

3.8.2. Measured Long Idle State power (P_{LONG_IDLE}) shall be less than or equal to the Maximum Idle State Power Requirement (P_{IDLE_MAX}), as calculated per Equation 7.

Equation 7: Calculation of P_{IDLE_MAX} for Small-scale Servers

$$P_{IDLE\_MAX} = P_{IDLE\_BASE} + (N - 1) \times P_{IDLE\_HDD} + P_{EEE}$$

Where:

— N is equal to the number of installed storage devices in the Small Scale Server (either hard disk drives or solid state drives);

— P_{IDLE_BASE} is the base allowance as specified in Table 10;

— P_{IDLE_HDD} is the hard drive allowance as specified in Table 10; and

— P_{EEE} is an EEE allowance of 0,2 W per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.

Table 10

Idle Mode Power Allowances for Small-scale Servers

P_{IDLE_BASE} (watts)	P_{IDLE_HDD} (watts)
24,0	8,0

3.9.   *Requirements for Thin Clients*

3.9.1.   Calculated Typical Energy Consumption (E_{TEC}) per Equation 1 shall be less than or equal to the Maximum TEC Requirement (E_{TEC_MAX}), as calculated per Equation 8, subject to the following requirements.

(i)   Allowances can only be applied if the corresponding adders are enabled by default.

(ii)   Thin Clients can utilize the proxy weightings in Table 3 when calculating E_{TEC}.

(iii)   For Thin Clients that lack a discrete System Sleep Mode, Long Idle State power (P_{LONG_IDLE}) may be used in place of Sleep Mode Power (P_{SLEEP}) in Equation 1 so long as the system meets the Thin Client TEC allowance. In such instances, ($P_{SLEEP} \times T_{SLEEP}$), is replaced by ($P_{LONG\_IDLE} \times T_{SLEEP}$); Equation 1 remains otherwise unchanged.

Equation 8: Calculation of E_{TEC_MAX} for Thin Clients

$$E_{TEC\_MAX} = TEC_{BASE} + TEC_{GRAPHICS} + TEC_{WOL} + TEC_{INT\_DISPLAY} + TEC_{EEE}$$

Where:

— *TEC_{BASE}* is the Base Allowance specified in Table 11;

— *$TEC_{GRAPHICS}$* is the Discrete Graphics allowance specified in Table 11 if applicable;

— *TEC_{WOL}* is the Wake-on-LAN allowance specified in Table 11 if applicable;

— *$TEC_{INT\_DISPLAY}$* is the Integrated Display allowance for Integrated Desktops specified in Table 7 if applicable; and

— *TEC_{EEE}* is the Energy Efficiency Ethernet incentive for Desktops specified in Table 7 if applicable, per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.

Table 11

Adder Allowances for Thin Clients

Adder	Allowance (kWh)
TEC_{BASE}	60
$TEC_{GRAPHICS}$	36
TEC_{WOL}	2

4.   **Testing**

4.1.   *Test Methods*

4.1.1.   For products placed on the market of the European Union manufacturers are required to perform tests and self-certify those models that meet ENERGY STAR guidelines. When testing Computer products, the test methods identified in Table 12 shall be used to determine ENERGY STAR qualification.

Table 12

Test Methods for ENERGY STAR Qualification

Product Type or Component	Test Method
All	ENERGY STAR Test Method for Computers, Rev. August-2014

4.2.   *Number of Units Required for Testing*

4.2.1.   Representative Models shall be selected for testing per the following requirements:

(i)   For qualification of an individual product configuration, the unique configuration that is intended to be marketed and labelled as ENERGY STAR is considered the Representative Model.

(ii)   For qualification of a Product Family of all product types, with the exception of Workstations, product configurations that represent the worst-case power consumption for each product category within the family are considered Representative Models. When submitting Product Families, manufacturers continue to be held accountable for any efficiency claims made about their products, including those not tested or for which data were not reported.

(iii)   For systems that meet the definition for multiple categories (as defined in Section 1.B) depending on the specific configuration, manufacturers will have to submit the highest power configuration for each category under which they would like the system to be ENERGY STAR qualified. For example, a system that could be configured as either a Category 0 or 1 Desktop, as defined in Table 6 would require submittal of the highest power configuration for both categories in order to be ENERGY STAR qualified. If a product could be configured to meet all categories, it would then have to submit data for the highest power configuration in all categories.

(iv)   For qualification of a Product Family of Workstations under the Workstation or Desktop product type, the product configuration that represents the worst-case power consumption with a single GPU within the family is considered the Representative Model.

Note: Workstations that meet ENERGY STAR requirements with a single graphics device may also have a configuration with more than one graphics device be ENERGY STAR qualified, provided the additional hardware configuration is identical with the exception of the additional graphics device(s). The use of multiple graphics includes, but is not limited to, driving multiple displays and ganging for high performance, multi-GPU configurations (e.g. ATI Crossfire, NVIDIA SLI). In such cases, and until such time as SPECviewperf® supports multiple graphics threads, manufacturers may submit the test data for the workstation with the single graphics device for both configurations without retesting the system.

4.2.2.   A single unit of each Representative Model shall be selected for testing.

4.2.3.   All units/configurations for which a Partner is seeking ENERGY STAR qualification, must meet the ENERGY STAR requirements. However, if a Partner wishes to qualify configurations of a model for which non-ENERGY STAR qualified alternative configurations exist, the Partner must assign the qualified configurations an identifier in the model name/number that is unique to ENERGY STAR qualified configurations. This identifier must be used consistently in association with the qualified configurations in marketing/sales materials and on the ENERGY STAR list of qualified products (e.g. model A1234 for baseline configurations and A1234-ES for ENERGY STAR qualified configurations).

Note: There may be cases—as described in the paragraph above—where not all units/configurations will meet ENERGY STAR requirements. If so, the worst-case configuration for test will be the worst-case qualified configuration, and not one of the presumably even higher-energy consuming non-qualified configurations.

4.3. *International Market Qualification*

4.3.1. Products shall be tested for qualification at the relevant input voltage/frequency combination for each market in which they will be sold and promoted as ENERGY STAR.

4.4. *Customer Software and Management Service Pre-Provisioning*

4.4.1. If a manufacturing Partner is hired by a customer to load a custom image on an ENERGY STAR qualified computer, the Partner shall take the following steps:

(i) Inform the customer that their product may not meet ENERGY STAR with the custom image. A sample notification letter is available on the ENERGY STAR Web site.

(ii) Encourage the customer to test the product for ENERGY STAR compliance.

5. **User Interface**

5.1.1. Manufacturers are encouraged to design products in accordance with the user interface standard IEEE 1621: Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments. For details, see http://eetd.LBL.gov/Controls.

6. **Effective Date**

6.1.1. The date that manufacturers may begin to qualify products as Energy Star under this Version 6.1, will be defined as the effective date of the Agreement. To be ENERGY STAR qualified, a product model shall meet the ENERGY STAR specification in effect on its date of manufacture. The date of manufacture is specific to each unit and is the date on which a unit is considered to be completely assembled.

6.1.2. Future Specification Revisions: EPA and the European Commission reserves the right to change this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through stakeholder discussions. In the event of a specification revision, please note that the ENERGY STAR qualification is not automatically granted for the life of a product model.

Appendix A

SAMPLE CALCULATIONS

I. **Desktop, Integrated Desktop, Notebook Computers:** Below is a sample TEC calculation intended to show how levels for compliance are determined based on functional adders and operational mode measurements.

Following is a sample E_{TEC} evaluation for a 2,0 GHz, dual core Notebook with Switchable Graphics, 8 GB Memory, Energy Efficient Ethernet (EEE), and 1 hard disk drive (HDD).

A. Measure values using the ENERGY STAR Computers Test Method:

(1) Off Mode = 1,0 W

(2) Sleep Mode = 1,7 W

(3) Long Idle State = 8,0 W

(4) Short Idle State = 10,0 W

B. Determine the proxy support provided by the operating system and network card. This is a manufacturer-reported parameter.

(1) On Mac computers, "Wake for network access" enabled within the Energy Saver/Power Adapter Preferences signifies Base Capability or better.

(2) On Windows computers, "ARP Offload" or "NS Offload" or similar enabled within the Advanced Properties of the Network Interface Card (accessed through the Device Manager) signifies Base Capability or better. OEM can provide further guidance on how to confirm Proxy Support

C. Calculate E_{TEC} from power measurements and mode weightings—this example assumes no Proxy Support/ Conventional Weightings:

T_{OFF}	25 %
T_{SLEEP}	35 %
T_{LONG_IDLE}	10 %
T_{SHORT_IDLE}	30 %

(1) $E_{TEC} = \dfrac{8\,760}{1\,000} \times (P_{OFF} \times T_{OFF} + P_{SLEEP} \times T_{SLEEP} + P_{LONG\_IDLE} \times T_{LONG\_IDLE} + P_{SHORT\_IDLE} \times T_{SHORT\_IDLE})$

(2) $E_{TEC} = \dfrac{8\,760}{1\,000} \times (1{,}0\,W \times 25\,\% + 1{,}7\,W \times 35\,\% + 8{,}0\,W \times 10\,\% + 10{,}0\,W \times 30\,\%)$

(3) $E_{TEC} = 40{,}7\ kWh/year$

D. Determine which Base TEC allowance applies based on graphics capability and performance score: *P = [# of CPU cores] × [CPU clock speed (GHz)] = 2×2 GHz = 4.*

Table 6

Base TEC (TEC_BASE) Allowances

Category Name	Graphics Capability	Notebook	
		Performance Score, *P*	Base Allowance
I1	Integrated or Switchable Graphics	2 < P ≤ 5,2	22,0

E. Determine which Functional Adder Allowances apply:

(1) Memory: *8 GB installed, so a TEC_MEMORY allowance of* $8\ GB \times 0{,}8\ \dfrac{kWh}{GB} = 6{,}4\ kWh$ *applies*

(2) Discrete Graphics? *No, therefore TEC_GRAPHICS allowance does not apply.*

(3) Switchable Graphics? *Yes, but TEC_SWITCHABLE allowance does not apply to Notebooks.*

(4) Energy Efficient Ethernet (EEE)? *Yes, and assuming one EEE-compliant Ethernet port, a TEC_EEE allowance of 8,76 × 0,2 × (0,10 + 0,30) = 0,7 kWh applies*

(5) Storage? *No, the notebook has only one hard disk drive, so no storage allowance applies.*

(6) Integrated Display? *Yes, and assuming a non-enhanced performance, 14 inch display with an area of 83,4 square inches and a resolution of 1,05 megapixels, a $TEC_{INT\_DISPLAY}$ allowance of 8,76 × 0,30 × (1 + EP) × (2 × r + 0,02×A) = 8,76 × 0,30 × (2 × 1,05 MP + 0,02×83,4 in²) = 9,9 kWh applies.*

F. Calculate E_{TEC_MAX}:

(1) E_{TEC_MAX} = 22,0 kWh + 6,4 kWh + 0,7 kWh + 9,9 kWh

(2) E_{TEC_MAX} = 39,0 kWh/yr

G. Compare E_{TEC} to the E_{TEC_MAX} to determine if the model qualifies:

40,7 kWh/yr > 39,0 kWh/yr

Therefore, the Notebook does not meet ENERGY STAR requirements.

II. **Workstations:** Below is a sample P_{TEC} calculation for a Workstation with 2 hard drives and no Energy Efficient Ethernet capability.

A. Measure values using the ENERGY STAR Computers Test Method:

(1) Off Mode = 2 W

(2) Sleep Mode = 4 W

(3) Long Idle State = 50 W

(4) Short Idle State = 80 W

(5) Max Power = 180 W

B. Note number of Hard Drives installed: Two hard drives installed during test.

C. Calculate P_{TEC} from power measurements and mode weightings using Equation 4:

T_{OFF}	T_{SLEEP}	T_{LONG_IDLE}	T_{SHORT_IDLE}
35 %	10 %	15 %	40 %

(1) P_{TEC} = (35 % × P_{OFF} + 10 % × P_{SLEEP} + 15 % × P_{LONG_IDLE} + 40 % × P_{SHORT_IDLE})

(2) P_{TEC} = (35 % × 2 W + 10 % × 4 W + 15 % × 50 W + 40 % × 80 W)

(3) P_{TEC} = 40,6 W

D. Calculate the P_{TEC_MAX} requirement using Equation 5:

(1) P_{TEC_MAX} = 0,28× (P_{MAX} + N_{HDD} × 5) + 8,76×P_{EEE}×(T_{SLEEP} + T_{LONG_IDLE} + T_{SHORT_IDLE})

(2) P_{TEC_MAX} = 0,28×(180 + 2 × 5) + 8,76 × 0 × (T_{SLEEP} + T_{LONG_IDLE} + T_{SHORT_IDLE})

(3) P_{TEC_MAX} = 53,2 + 0

E. Compare P_{TEC} to the ENERGY STAR levels to determine if the model qualifies:

40,6 W ≤ 53,2 W

Therefore, the Workstation meets ENERGY STAR requirements.

TEST METHODS (REVISION AUGUST 2014)

1. **Overview**

The following test method shall be used for determining product compliance with requirements in the ENERGY STAR Specification for Computers.

2. **Applicability**

ENERGY STAR test requirements are dependent upon the feature set of the product under evaluation. The following guidelines shall be used to determine the applicability of each section of this document:

— The procedure in Section 6 shall be conducted on all eligible products that are covered under the scope as defined in Section 2 of the ENERGY STAR Final Draft Eligibility Criteria for Computers.

— The procedure in Section 7 shall be conducted only on eligible Workstation Computer products.

3. **Definitions**

Unless otherwise specified, all terms used in this document are consistent with the definitions in the ENERGY STAR Specification for Computers.

4. **Test Setup**

4.1. *Test Setup and Instrumentation*

Test setup and instrumentation for all portions of this procedure shall be in accordance with the requirements of European Standard EN 50564:2011 (derived from IEC 62301:2011) "Electrical and electronic household and office equipment — Measurement of low power consumption", Section 4, "General Conditions for Measurements", unless otherwise noted in this document. In the event of conflicting requirements, the ENERGY STAR test method shall take precedence.

A. Input Power: Products intended to be powered from alternating current (ac) mains shall be connected to a voltage source appropriate for the intended market, as specified in Table 13 and Table 14.

Table 13

Input Power Requirements for Products with Nameplate Rated Power Less Than or Equal to 1 500 watts (W)

Market	Voltage	Voltage Tolerance	Maximum Total Harmonic Distortion	Frequency	Frequency Tolerance
Europe, Australia, New Zealand	230 V ac	+/– 1,0 %	2,0 %	50 Hz	+/– 1,0 %

Table 14

Input Power Requirements for Products with Nameplate Rated Power Greater Than 1 500 W

Market	Voltage	Voltage Tolerance	Maximum Total Harmonic Distortion	Frequency	Frequency Tolerance
Europe, Australia, New Zealand	230 V ac	+/– 4,0 %	5,0 %	50 Hz	+/– 1,0 %

B. Ambient Temperature: Ambient temperature shall remain between 18 °C and 28 °C, inclusive, for the duration of the test.

C. Relative Humidity: Relative humidity shall remain between 10 % and 80 %, inclusive, for the duration of the test.

D. Light Measuring Device (LMD): All LMDs shall meet the following specifications:

(1) Accuracy: ± 2 % (± 2 digits) of the digitally displayed value; and

(2) Acceptance Angle: 3 degrees or less.

The overall tolerance of LMDs is found by taking the absolute sum of 2 % of the targeted screen luminance and a 2 digit tolerance of the displayed value's least significant digit. For example, if the screen luminance value is 90 candela per meter squared (cd/m^2) and the LMD's least significant digit is a tenth of one cd/m^2, 2 % of 90 cd/m^2 would be 1,8 cd/m^2 and a 2 digit tolerance of the least significant digit would be 0,2 cd/m^2. Thus, the displayed value would need to be 90 ± 2 cd/m^2 (1,8 cd/m^2 + 0,2 cd/m^2).

Note: The term "nit" is sometimes used instead of the official SI unit cd/m^2. One nit is equivalent to one cd/m^2.

E. Power Meter: Power meters shall possess the following attributes:

(1) Crest Factor:

(a) An available current crest factor of 3 or more at its rated range value; and

(b) A bound on the current range of 10 milliamperes (mA) or less.

(2) Minimum Frequency Response: 3,0 kilo-hertz (kHz)

(3) Minimum Resolution:

(a) 0,01 W for measurement values less than 10 W;

(b) 0,1 W for measurement values from 10 W to 100 W; and

(c) 1,0 W for measurement values greater than 100 W.

(4) Measurement Accuracy: Measurement uncertainty as introduced by the instrument that measures the input power to the unit under test (UUT), including any external shunts.

(a) Power measurements with a value greater than or equal to 0,5 W shall be made with an uncertainty of less than or equal to 2 % at the 95 % confidence level.

(b) Power measurements with a value 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.

5. **Test Conduct**

5.1. *Guidance for Implementation of EN 62623*

The Test Conduct shall be carried out according to the requirements in European Standard EN 62623:2013 (identical to IEC 62623:2012) "Desktop and Notebook Computers — Measurement of Energy Consumption" reference with the following guidance.

A. Small-Scale Servers, Thin Clients, and Workstations shall be configured in a manner identical to Desktops (non-integrated) unless otherwise specified. Slates/Tablets shall be configured in a manner identical to Notebooks unless otherwise specified. Portable All-In-One Computers shall be configured in a manner identical to Integrated Desktops unless otherwise specified.

(1) Thin Clients shall run intended terminal/remote connection software during all tests.

B. Wake on LAN (WoL) settings shall be in as shipped condition for testing Sleep Mode and Off Mode.

C. For models that do not offer a Sleep Mode enabled by default, Section 6.2 shall measure power in the lowest-latency user-activated mode or state that preserves machine state and is enabled by default.

(1) If no such state separate from Long Idle State or Off Mode exists, the measurement in Section 6.2 shall be skipped.

D. For Long Idle Mode Testing (Section 6.3), the UUT shall be allowed no more than 20 minutes from the point of ceased user input before measurements must be started. If any default settings cause the UUT to enter Long Idle after 20 minutes, begin taking measurements when the UUT has reached the 20 minute mark. Display sleep settings shall be set to default for Long Idle Mode Testing.

E. For Short Idle Mode Testing (Section 6.4), the UUT shall be allowed no more than five minutes from the point of ceased user input before measurements must be taken. Display sleep settings shall be disabled for Short Idle Mode Testing. If any other default settings cause the UUT to exit Short Idle during the measurement time, extend the settings so that the UUT remains in short idle for the duration of the measurement.

F. Desktops, Integrated Desktops, Notebook Computers, Portable All-In-One Computers, and Slates/Tablets shall be tested for Idle, Sleep, and Off Mode with Full Network Connectivity ("Proxying") features using the as shipped setting.

G. Cellular network connections shall be disabled for testing. Additionally, Bluetooth should be left as-shipped.

5.2. *Preparing Display Luminance of Notebooks, Integrated Desktops, Slates/Tablets and Portable All-In-One Computers*

A. Before performing any tests, disable display dimming, display Sleep Mode, Computer Sleep Mode, and automatic brightness control (ABC) in the Computer settings. Document all settings that were changed from the default configuration.

(1) If ABC cannot be disabled, position a light source such that at least 300 lux directly enters the ABC sensor.

B. Display the three vertical bar video signal as defined in section 3.2.1.3 of European Standard EN 60107-1:1997 (identical to IEC 60107-1:1997) "Methods of measurement on receivers for television broadcast transmissions — Part 1: General conditions — Measurements at radio and video frequencies". The three bar image shall be configured using the default image display application.

C. Devices with a cold cathode fluorescent lamp (CCFL) backlight shall warm-up for at least 30 minutes. All other displays shall warm-up for at least 5 minutes.

D. With the LMD, measure the luminance in the centre of the display.

E. Calibrate the UUT display brightness to the closest brightness setting that is at least 90 cd/m² for Notebook Computers, at least 150 cd/m² for Integrated Desktop Computers, Portable All-In-One Computers and Slates/Tablets. If the UUT's brightest setting cannot achieve the specified brightness, then set the UUT display to the brightest setting.

F. the display shall be configured with the ENERGY STAR test image, which can be found in https://www.energystar.gov/ia/partners/images/ComputerTestingImage.bmp. For Desktops, Integrated Desktops, Notebook Computers and Portable All-In-One Computers it may be set as the "desktop background" (wallpaper) or shown via an image display application. The image shall be scaled to completely fill the display area. For Slates/Tablets, the display shall be configured with the default image display application.

G. For all testing specified in Section 6, the UUT shall not be rebooted or restarted until after the power measurements for Long Idle Mode and Short Idle Mode tests are taken.

H. Slate/Tablet and Portable All-In-One Computers shall be tested with a docking station only if it is shipped with the product and is the only way to power the device mains.

6. **Test Procedures for all Products**

6.1. *UUT Preparation*

UUT preparation shall be performed according to European Standard EN 62623:2013 (identical to IEC 62623:2012), Section 5.2: Test Setup; with the additional guidance in Section 5 of this document.

6.2. *Sleep Mode Testing*

Sleep Mode power shall be measured according to European Standard EN 62623:2013 (identical to IEC 62623:2012), Section 5.3.3: Measuring Sleep Mode; with the additional guidance in Section 5 of this document.

6.3. *Long Idle Mode Testing*

Long Idle Mode power shall be measured according to European Standard EN 62623:2013 (identical to IEC 62623:2012), Section 5.3.4: Measuring Long Idle Mode; with the additional guidance in Section 5 of this document.

6.4. *Short Idle Mode Testing*

Short Idle Mode power shall be measured according to European Standard EN 62623:2013 (identical to IEC 62623:2012), Section 5.3.5: Measuring Short Idle Mode; with the additional guidance in Section 5 of this document.

6.5. *Off Mode Testing*

Off Mode power shall be measured according to European Standard EN 62623:2013 (identical to IEC 62623:2012), Section 5.3.2: Measuring Off Mode; with the additional guidance in Section 5 of this document.

6.6. *Additional Testing For Reporting*

For Notebook Computers, repeat the Short Idle test with the display brightness set to the closest setting that is at least 150 cd/m^2.

7. **Test Procedures for Workstations**

7.1. *Maximum Power Test*

The maximum power for Workstations is found by the simultaneous operation of two industry standard benchmarks: Linpack to stress the core system (e.g., processor, memory, etc.) and SPECviewperf® (latest available version for the UUT) to stress the system's Graphics Processing Unit (GPU). This test shall be repeated three times on the same UUT, and all three measurements shall fall within a ± 2 % tolerance relative to the average of the three measured maximum power values. The average power should be used for qualification and/or TEC calculations.

Additional information on these benchmarks, including free downloads, can be found at the following locations as specified in Table 15.

Table 15

Benchmark Information for Maximum Power Test

Benchmark	Website
Linpack	http://www.netlib.org/linpack/
SPECviewperf	http://www.spec.org/benchmarks.html#gpc

A. UUT Preparation:

(1) Connect a power meter capable of measuring true power to an AC line voltage source set to the appropriate voltage/frequency combination for the test. The meter shall have all the attributes listed in Section 4.1 E). The meter shall also store and output the maximum power measurement reached during the test or be capable of another method of determining maximum power.

(2) Plug the UUT into the measurement power outlet on the meter. No power strips or uninterruptible power supply (UPS) units shall be connected between the meter and the UUT.

(3) Record the ac voltage.

(4) Boot the UUT and, if not already installed, install Linpack and SPECviewperf as indicated on the above Websites.

(5) Set Linpack with all the defaults for the given architecture of the UUT and set the appropriate array size "n" for maximizing power draw during the test.

(6) Ensure all technical guidelines relevant to running the benchmark set by the Standard Performance Evaluation Corporation (SPEC) organization for running SPECviewperf have been met.

(7) For additional information regarding Linpack setup, see Section 9.1 Typical Linpack Starting Parameters.

B. Maximum Power Testing:

(1) Set the meter to begin accumulating true power values at a rate greater than or equal to one reading per second, and begin taking measurements.

(2) Run SPECviewperf and as many simultaneous instances of Linpack as needed to fully stress the system. Recommended setup information can be found in Section 9.1 C).

(3) Accumulate power values until SPECviewperf and all Linpack instances have completed running. Record the maximum power value attained during the test.

(4) The following data shall also be recorded:

(a) Value of "n" (the array size) used for Linpack;

(b) Number of simultaneous copies of Linpack run during the test;

(c) Version of SPECviewperf run for test;

(d) All compiler optimizations used in compiling Linpack and SPECviewperf; and

(e) A precompiled binary for end users to download and run both SPECviewperf and Linpack. These can be distributed either through a centralized standards body such as SPEC, by the original equipment manufacturer (OEM), or by a related third party.

7.2. *Benchmark Test*

The benchmark test shall be performed by running both benchmarks listed below separately. The UUT shall be rebooted before testing with each benchmark. Additional information on these benchmarks, including downloads, can be found at the following locations specified in Table 16. All testing shall be performed with the latest available version of the benchmarks.

Table 16

Information for Benchmark Testing

Benchmark	Website
Linpack	http://www.netlib.org/linpack/
SPECviewperf	http://www.spec.org/benchmarks.html#gpc

A. UUT Preparation:

(1) The UUT shall be setup identical to Step 1) through Step 4) of Section 7.1 A)

(2) If not already installed, install the benchmark as indicated on the websites listed in Table 16.

(3) Configure the benchmark as specified in Section 7.2 B).

(4) Time Measurement: Time measurements may be performed with a standard stopwatch or other time keeping device with a resolution of at least 1 second.

B. Benchmark Configurations:

(1) Linpack

(a) Configure the Linpack settings identically to the maximum power workstation test (e.g. Follow Step 5) and Step 7) of Section 7.1 A)).

(b) Run as many simultaneous instances of Linpack as needed to fully stress the system. Recommended settings would be to set the number of simultaneous instances of Linpack equal to the number of logical and/or physical CPU cores of the system.

(2) SPECviewperf

(a) Configure the settings identically to the maximum power workstation test (e.g. Follow Step 6) of Section 7.1 A)).

C. Benchmark Testing:

(1) Set the meter to begin accumulating true power values at a rate of greater than or equal to one reading per second and begin power and time measurement.

(2) Execute the benchmark.

(3) Stop time measurement and accumulate power values for the entire duration of the benchmark run.

(4) The following data shall be reported:

(a) Linpack

(i) Value of "n" (the array size) used for Linpack;

(ii) Number of instances of Linpack simultaneously run on the system;

(iii) All compiler options used in compiling Linpack;

(iv) Energy consumed over the duration of the test; and

(v) Linpack output file in text format which contains system performance in floating point operations per second (Flops) in addition to other Linpack parameters (e.g. number of tests, problem size, etc.).

(b) SPECviewperf

(i) Version of SPECviewperf used;

(ii) All compiler optimizations used in compiling SPECviewperf;

(iii) Duration of the test;

(iv) Energy consumed over the duration of the test; and

(v) All files and folders present in the Result folder of SPECviewperf suite shall be reported.

8. **References**

A. European Standard EN 50564:2011 (derived from IEC 62301:2011), Electrical and electronic household and office equipment — Measurement of low power consumption.

B. European Standard EN 60107-1:1997 (identical to IEC 60107-1:1997), Methods of measurement on receivers for television broadcast transmissions — Part 1: General Considerations — Measurements at radio and video frequencies.

C. European Standard EN 62623:2013 (identical to IEC 62623:2012), Desktop and notebook computers — Measurement of energy consumption

9. **Appendix: Benchmark Parameters**

9.1. *Typical Linpack Starting Parameters*

Below are some typical starting values for the use of Linpack for testing Workstations. These values are starting points and not meant to be binding. The tester is free to use the settings most advantageous to their UUT. Platform and Operating System (OS) will have a significant impact on the applicability of these starting values. The below assumes Linux as the test OS.

A. Number of equations (problem size): See Equation.

B. Leading dimensions of array: See Equation.

The matrix size (the combination of number of equations and leading dimensions of array) should be the maximum size that will fit in the Random Access Memory (RAM) on the machine. This AWK script will calculate matrix size on a Linux machine:

awk '

BEGIN {

printf "Maximum matrix dimension that will fit in RAM on this machine:"

}

/^MemTotal:/{

*print int(sqrt(($2*1 000)/8)/1 000) "K"*

}

'/proc/meminfo

Use the output of this to determine what matrix size to input for both the "Number of equations" and "Leading dimensions of array" inputs. The "Number of equations" will be equal to the printed output. The "Leading dimensions of the array" will be the output rounded up to the nearest multiple of eight.

This calculation can be most easily calculated by taking the memory size, in bytes, of the UUT (denoted as m) and substituting m in Equation 1.

$$\frac{\sqrt{\frac{m \times 1\,000}{8}}}{1\,000}$$

Equation 9: Memory Size Calculation

C. *Number of trials:* c − 1 where c equals the number of logical and/or physical CPU cores of the system. The tester needs to determine which is more advantageous for the unit. The − 1 leaves one core open for use by SPECviewperf.

D. *Data alignment value:* Typically four with Linux systems. The best value to use is the page size boundary of the OS.'

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