TCO DEVELOPMENT

TCO Certified Desktops 5.0

11 November 2015

TCO DEVELOPMENT

Contents - TCO Certified Desktops

Certification Support

If you would like to certify your products and need support in understanding TCO Certified, this criteria document and the certification process, TCO Development's test and verification partners around the world are available to help clarify this document and assist you with certification in your native language.

For a list of accredited test and verification partners, contact certification@tcodevelopment.com or log onto www.tcodevelopment.com

Introduction

TCO Certified is an international third party sustainability certification for IT products. By choosing TCO Certified computers, displays and other devices, businesses and organizations around the world are able to help meet environmental and social challenges associated with electronics.

Since the end of the 1980s, TCO Development has advanced the sustainable development of IT products. Today our international certification system – TCO Certified – makes it easier to choose sustainably designed and manufactured IT products such as displays, computers, smartphones and tablets. TCO Certified is a third party certification, Type 1 Eco Label according to ISO14024.

Sustainability in all life cycle phases

Electronics are associated with many different sustainability risks throughout the life cycle, including manufacturing, use and end of life phases. Criteria in TCO Certified aim to address many of these challenges throughout the life cycle, making it the most comprehensive third party certification for IT products. For each criteria area in this document, the relevant life cycle phase is indicated by the following icons:

Criteria – Manufacturing phase
Socially responsible manufacturing, environmental management system.

Criteria – use phase
Climate, ergonomics, health and safety, extended product life and emissions.

Criteria – end of life phase
Reduction of hazardous content and chemicals, design for recycling

With every major update we aim to enhance the criteria in line with technology innovation and sustainability challenges. Updates are a result of dialog with key stakeholders, such as purchasers, users, industry, and subject matter experts. This criteria document, TCO Certified Desktops 5.0, is the fifth version of TCO Development's certification of Desktops. Moving forward, subsequent versions, 5.1, 5.2 etc., may be released. However, these are to be considered only as updates within the fifth version, with improved precision of the mandates and test methods.

Citing from these criteria (e.g. in procurement contracts) is permitted, provided that the source is disclosed and the extent of the quotation is consistent with sound copyright practice. For further information, please visit www.tcodevelopment.com.

TCO Development, Stockholm, November, 2015

A Criteria

A.1 General Information

This document contains requirements, test methods and references for Desktop computers. Desktop computers, such as desk-side computers and computers of tower type, are defined for the purposes of this document as follows:

Desktop definition

A Desktop computer is a computer with the configuration that includes hardware such as a mother board, a processor, a hard disc drive, memory boards, graphics card, CD/DVD-drive, a modem, a network card and a fan for cooling, all enclosed in one casing. A Desktop computer can communicate with the end user via a display that can be connected via analogue or digital I/O ports.

The criteria document setup

The aim of this criteria document is to provide relevant criteria and test methods covering all life cycle phases of the product. Criteria are set so that 30-50% of the products available on the market can pass. This criteria document consists of two parts; Part A- the mandated criteria and Part B - clarifications and test methods.

Compliance

Compliance with the mandates in this document can be achieved in one of two ways; either through a test report or through a verification report. Compliance methods can vary by criterion and are specified under each mandate.

1. A test report is defined as a report based on:
    - Testing conducted by the facility issuing the test report for the product identified in the report.
2. A verification report is defined as a summary report and a verdict (pass or fail) based on either:
    - A test report issued by the same facility
    - A test report issued by a different facility.
    - Declarations, certificates or other proof from the Company or Brand owner applying for the certificate.

The options accepted by TCO Development for each criterion can be found under each mandate.

A.1.1 Information to End-Users

Background
It is important that the purchaser of a product that has been certified in accordance with TCO Certified Desktops receive information concerning the quality, features and capabilities of the product. This information is based on the viewpoint from the user's perspective that TCO Development represents.

Applicability
All Desktop computers.

Life Cycle Phase

Clarification
See B.1.1

References
The contract between TCO Development and the Applicant/Brand owner.

Mandate A.1.1:

An information document called "TCO Certified Document" provided by TCO Development shall accompany the product to describe why these particular criteria have been chosen for the products within the TCO Certified program, and what is expected to be achieved by them. The document shall be written in English or the native language where the product is to be sold.

Examples of how the document can accompany the product:

- As a separate printed document.

- As a digital file or printed in the user manual.

- As a direct link from the user manual or digital file to the document on the manufacturer's web site.

Submit the following to an approved verifier:

1. Information on how the TCO Certified Document accompanies the product

2. A written guarantee that the above mandate is fulfilled. The document shall be signed by the responsible person at the applicant company.

Submit the following together with the application to TCO Development:

A copy of a verification report from a test facility approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

A.3 Workload ergonomics

Work load ergonomics refers to the adaptation of the task, tools, work place and physical environment where the product will be used. These requirements are in place in order to meet and optimize the users' needs for a good work environment.

Life Cycle Phase

A.3.1 Easily accessible connections

Background

It should be easy to connect common external devices, such as a USB memory stick. A digital connection on the Desktop computer guarantees a high quality signal to the display, which enhances the visual ergonomics of the display

Applicability

All Desktop computers.

References

2.

Mandate A.3.1:

At least one USB connection or similar interface socket shall be located on the front side of the Desktop computer.

The following information shall be submitted with the application to TCO Development:

A copy of a verification report from a test facility approved by TCO Development.

A.4 Emissions

Users of IT equipment increasingly have several nearby electrical and magnetic field sources placed on work surfaces that they are exposed to. When the first TCO certification for IT products was introduced in 1992, one of the main interests was the criteria for reducing electrical and magnetic fields. To this day scientists and experts are divided on the question of whether these fields pose any risks to human health.

Due to continued public concern and the increasing amount of emissions surrounding us, TCO Development remains convinced that the criteria in TCO Certified are still relevant, even with today's slimline, low emissions products. TCO Certified emissions criteria are intended to make certain that internal shielding is used to ensure that a TCO Certified product's emissions are at a technically achievable low level and will not raise normal background levels when the product is used in a working environment.

TCO Certified criteria cover emissions around the product since it may be placed near other persons working in close proximity.

Some displays are sold without the stand for mounting on walls or on a custom VESA compatible stand by the end user. The type of stand may have a big impact on the measurements of the alternating electric and magnetic field. As it is impossible to know the actual type of stand the end user will choose it is not possible to set up a test condition that represents the real situation. Because of that displays delivered without the stand are excluded from the criteria on alternating electric and magnetic fields.

Many people find acoustic noise annoying and especially high-pitched noise. To prevent annoyance TCO Development sets requirements to limit the noise from products with integrated fans.

Life Cycle Phase

A.4.1 Alternating electrical fields

Background

Alternating electrical fields are created between objects that have different levels of electrical potential that change over time. When the potential changes in a periodic manner, an alternating electrical field is set up, with a field strength and a frequency. An IT product can contain many sources of alternating electrical fields. The field characteristics depend on the actual electrical potential difference and the distance from the product.

Some users are concerned about a possible health risk arising from electrical alternating fields generated by IT products. The mandatory criteria are aimed at reducing the electrical alternating fields to such a low level so as not to burden the work and home environment with unnecessary factors. The mandatory criteria shall not be regarded as hygienic limit values.

Applicability

All Desktop computers.

Test procedure

See B.4.1.

Mandate A.4.1:

Band I: 5 Hz to 2 kHz, ≤ 10 V/m

Measured at 0.50 m in front of the Desktop computer.

Band II: 2 kHz to 400 kHz, ≤ 1.0 V/m

Measured at 0.50 m around the Desktop computer.

The following information shall be submitted with the application to TCO Development:

A copy of a test report from a test facility approved by TCO Development.

A.4.2 Alternating magnetic fields

Background

Magnetic alternating fields are created when an electrical alternating current flows through a conductor. IT products are surrounded by magnetic alternating fields that are generated by different parts of the product, e.g. power supply unit, voltage inverters and other electrical circuits. The field strength depends on the actual electric current and on the distance from the product.

Some users are concerned about a possible health risk arising from electrical alternating fields generated by IT products. The mandatory criteria are aimed at reducing the magnetic alternating fields to such a low level as not to burden the work and home environment with unnecessary factors. The mandatory criteria shall not be regarded as hygienic limit values.

Applicability

All Desktop computers.

Test procedure

See B.4.2.

Mandate A.4.2:

Band I: 5 Hz to 2 kHz, ≤ 200 nT

Measured at 0.50 m around the Desktop computer.

Band II: 2 kHz to 400 kHz, ≤ 25 nT

Measured at 0.50 m around the Desktop computer.

The following information shall be submitted with the application to TCO Development:

A copy of a test report from a test facility approved by TCO Development.

A.4.3 Acoustic noise

Background

Acoustic noise from fans, disk drives etc. can be annoying. To prevent such annoyance, the aim is for the IT product to produce minimal noise during usage. Many end-users are sensitive to noise with different characteristics. To give the end-user a possibility to choose a product with a comfortable noise level and frequency characteristics generated by a product, this information should be declared together with all other data relevant to the product in question.

Definitions

To be able to provide information about acoustic noise levels that permits comparison between different Desktop computers the declared A-weighted sound power level (L_{WAd}) in operating and idling mode measured in accordance with ISO 9296 shall be reported. The following definitions apply:

Sound power level (L_W):
Total emitted sound power from a sound source, given in bels (B) and with the reference 1 pW .

A-weighting:
The measured linear sound level (sound pressure or sound power) weighted against the sensitivity of the human ear for different frequencies (A-curve).

Declared A-weighted sound power level (L_{WAd}): in bels (B). Defined in accordance with ISO 9296 3.2.5.

Operating mode. A condition in which the system and hard disk drive shall be operated in accordance with ECMA-74 C.15.3.2 and C.9.3.2.

Idling mode. A condition in which the system shall be operated in accordance with ECMA-74 C.15.3.1.

Applicability

All Desktop computers with integrated moving parts.

Test procedure

See B 4.3 and ISO 7779:2010

References

3-9

Mandate A.4.3:

For Desktop computers with integrated moving parts, such as motor driven hdd, fans, etc.

1. The *declared A-weighted sound power level* (LWAd) shall not exceed:

***Operating mode:* 4.4B**

***Idling mode:* 3.9B**

If the product does not emit prominent discrete tones according to procedures specified in ECMA 74 Annex D a higher declared A-weighted sound power level (LWAd) is accepted but shall not exceed:

***Operating mode:* 4.7B**

***Idling mode:* 4.2B**

2. The A-weighted sound power level for a product shall be declared in the product data sheet and/or in any other product descriptions.

The following information shall be submitted with the application to TCO Development:

A copy of a test report from a test facility accredited according to ISO10025 and a verification report from a test facility approved by TCO Development.

A.5 Electrical safety

A.5.1 Electrical safety

Background
Electrical safety concerns the electrical design of apparatus with respect to its electrical insulation and other arrangements that are intended to prevent accidents resulting from contact with live components, and the risk of fire or explosion as a result of electrical flash-over due to inadequate or faulty electrical insulation.

Applicability
All Desktop computers with built-in power supplies as well as any separate power supply intended to be used together with the Desktop computer.

Life Cycle Phase

References
10.

Mandate A.5.1:

The Desktop computer and the internal or external power supply/supplies shall be certified in accordance with EN/IEC 60 950 or EN/IEC 60 065 or EN 62368-1.

The following information shall be submitted with the application to TCO Development:

A copy of the CB certificate or national certificate from a CB member (NCB).

A.6 Environment

This section details the environmental criteria in TCO Certified, which offer a unique, integrated balance of environmental issues in the manufacturing, use and end of life phases of the product.

The environmental criteria are divided into the following sections:

1. Manufacturing – criteria focusing on the manufacturing phase and environmental management
2. Climate – energy consumption, one of the most important issues in the environmental impact of IT products.
3. Hazardous Substances – heavy metals, flame retardants, plastics.
4. Material resource efficiency – factors to extend the life of the product and influence better use of material resources.
5. End of life – factors to stimulate recycling and minimize the impact of e-waste.

Potential environmental effects are evident at each stage of the product life cycle. The environmental criteria TCO Development has focused on in this document are those that we consider most relevant to the product group. They have also proved to be attainable in volume manufacturing and are verifiable. Future criteria updates will likely focus on the manufacturing phase, hazardous substances and climate issues.

Compliance with these criteria, (except section *A.6.3 Climate)* is verified by sending the requested information to a verifier approved by TCO Development. The energy consumption requirements in section A.6.3 shall be tested at a test facility approved by TCO Development or an EPA approved test facility.

Life Cycle Phases

A.6.1 Product description

Background

The aim of this product description is to provide third party verified information about the product. The information is used by TCO Development to verify that the product complies with the criteria in TCO Certified.

The information is also provided on the certificate to buyers so that it helps them calculate the sustainability impact of the products and the benefit of buying products that fulfil TCO Certified.

Using the declared sustainability information a buyer can, for example, implement climate compensation or other sustainability-related measures connected to the sustainability impact of the purchased IT. This data is often used by organisations in their annual sustainability report or internal programs aimed at minimizing the environmental impact of IT.

Definition

Recycled plastic is post-consumer recycled plastic that has been used in products.

Plastic parts are all product parts made out of plastic except panels, electronic components, cables, connectors, PWBs, insulating mylar sheets and labels. This is primarily due to insufficient available alternatives. This also means that the weight of these items is not included when calculating the total weight of the plastic in the product in this requirement.

Marking plate /Marking label is the label that contains the product's electrical rating in terms of voltage, frequency, current and the manufacturer's name, trademark or identification mark together with the manufacturer's model or type reference. The label shall be in accordance with IEC 60 950:1 clause 1.7.1.

Applicability

All Desktop computers.

Life Cycle Phases

Clarification

B.6.1

References

10

Mandate A.6.1:

A product declaration shall be provided for the Desktop computer. The following information shall be verified by the third party facility and is printed by TCO Development on the certificate.

Submit the following to an approved verifier:

1. The declaration below, completed where applicable.

2. A copy of the marking label for the Desktop computer and any external power supply.

The information submitted shall be signed by the responsible person at the applicant company.

Submit the following together with the application to TCO Development:

A copy of a verification report including all information in the table below from a verifier approved by TCO Development and a copy of the marking label.

Desktop computer declaration

Desktop computer	**Information**
Manufacturer	
Brand name	
Brand Owner	
Type/Model name	
Product Family name	

External Power supply: brand & model name	**Rating and class**

Declared sustainability information

Percentage of *recycled plastic* by weight of total weight of plastic parts			
Total weight of the product and power supply (without packaging) in Kg			
Measured energy consumption according to Energy Star. *(This measured value of one sample may differ from declared values presented in other places due to a batch uncertainty that is normally added to cover all products leaving the production line)*			
Short Idle	Long Idle	Sleep mode	Off mode

We hereby guarantee that the above mandate is fulfilled.

…… ……

Product brand name Model name(s)

....

Signature Name and title in block capitals

....

Date Company

A.6.2 Manufacturing

A.6.2.1 Environmental management system certification

Background

A certified environmental management system shows that the company has chosen to work in a systematic way with constant improvement of the environmental performance of the company and its products. A certified environmental management system includes external independent reviews.

Definitions

Manufacturing plant: Production facility where the final assembly of the TCO certified product is taking place.

Applicability

The company or companies which manufacture the Desktop computer.

Life Cycle Phase

Clarification

B.6.2.1

References

11, 12.

Mandate A.6.2.1:

Each *manufacturing plant* must be certified in accordance with ISO 14001, or EMAS registered. If the product is manufactured by a third party, it is this company that shall be certified or registered.

Submit the following to an approved verifier:

1. A document showing the names and addresses of the manufacturing plants.

2. Copy of the ISO 14001 certificate or EMAS registration from each manufacturing plant.

3. A written guarantee that the certificate/registration is valid and that the mandate above is fulfilled, signed by the responsible person at the applicant company.

Submit the following together with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

A.6.3 Climate

A.6.3.1 Energy consumption

Background

Energy is the single most important topic in the issue of climate change. Energy efficient equipment is an important and effective way to fight climate change. With an ever-increasing volume of IT equipment in use, the efficiency of each product is vital.

This requirement and test method is based on the most recently published Energy Star® standard for computers.

Definitions

The energy consumption requirement in accordance with the most recently published Energy Star® standard for computers.

Applicability

All Desktop computers.

Life Cycle Phase

Test procedure

B.6.3.1

References

17

Mandate A.6.3.1:

The energy consumption requirements in the most recently published Energy Star® standard for computers on the date of application shall be fulfilled and verified through testing by a test facility approved by TCO Development or at any EPA approved test facility accredited according to ISO17025.

Submit the following together with the application to TCO Development:

A copy of a test report and a verification report from a test facility approved by TCO Development.

A.6.3.2 Energy consumption – external power supply

Background

Energy is the single most important topic in the issue of climate change. Energy efficient equipment is an important and effective way to fight climate change. With an ever-increasing volume of IT equipment in use, the efficiency of each product is vital. To reduce energy consumption from the product the external power supply shall comply with the International Efficiency Marking Protocol for External Power Supplies.

Applicability

All external power supplies.

Clarification

B.6.3.2

References

18

Mandate A.6.3.2:

The external power supply shall meet at least the International Efficiency Protocol requirement for level V.

Submit the following to the verifier at the test facility:

A copy of the marking label for the external power supply

Submit the following together with the application to TCO Development:

A copy of the marking label for the external power supply

A.6.4 Hazardous substances

A.6.4.1 Cadmium (Cd), mercury (Hg), lead (Pb) and hexavalent chromium (CrVI)

Background

The effects of cadmium, mercury, lead and hexavalent chromium are well documented as substances hazardous both to our health and the environment. Electronic devices contain hazardous substances like heavy metals and brominated flame retardants. This causes problems, both in the use phase (additives can leak from the plastic and accumulate in dust, harming both human health and the environment) and at end-of-life, where uncontrolled recycling can cause the release of toxins such as dioxins and furans.

This criterion is harmonized with EU RoHS2 Directive (2011/65/EU). As TCO Certified is a global label this also affects products sold outside the EU.

Applicability

All Desktop computers.

Life Cycle Phase



Clarification

B.6.4.1

References

19, 20 and 21.

Mandate A.6.4.1:

The Desktop computer shall not contain cadmium, mercury, lead and hexavalent chromium.

Submit the following to an approved verifier:

A written guarantee that the above mandate is fulfilled. The guarantee shall be signed by the responsible person at the applicant company.

Submit the following together with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

A.6.4.2 Halogenated substances

Background

Halogenated flame retardants and plasticizers are often persistent, can bio- accumulate in living organisms and have been detected in both humans and the environment. These substances may be problematic in the manufacturing and end of life phases where workers or the environment can be exposed. They can also migrate from the products during the use phase with unknown health effects as a result.

Definitions

Plastic parts are parts made mainly of plastics, e.g. the housing. Parts containing other materials in any significant amounts, e.g. cables with metal conductors, are not included in the definition.

Printed wiring board laminate is a printed board that provides point-to-point connections but not printed components in a predetermined configuration on a common base.

Halogens are a group of five chemically related non-metallic elements in the Periodic Table; fluorine, chlorine, bromine, iodine and astatine.

Polybrominated biphenyls (*PBB*) and Polybrominated diphenyl ethers (*PBDE*) are restricted in the RoHS directive (2002/95/EC) due to the hazardous properties of these substances. Hexabromocyclododecane (*HBCDD*) has been identified as a Substance of Very High Concern in accordance with EU REACH criteria due to PBT (persistent, bio accumulative, toxic) properties.

Applicability

All Desktop computers.

Clarification

B.6.4.2

References

22.

Mandate A.6.4.2:

1. *Plastic parts* weighing more than 25 grams shall not contain flame retardants or plasticizers that contain halogenated substances.

Note*:* This applies to plastic parts in all assemblies and sub-assemblies. Exempted are *printed wiring board laminates*, electronic components and all kinds of cable insulation.

2. The Desktop computer shall not contain PBB, PBDE and HBCDD.

Note: This applies to components, parts and raw materials in all assemblies and sub-assemblies of the product e.g. batteries, paint, surface treatment, plastics and electronic components.

Submit the following to an approved verifier:

A written guarantee that the above mandate is fulfilled. The guarantee shall be signed by the responsible person at the applicant company.

Submit the following together with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

A.6.4.3 Non-halogenated substances

Background

The purpose of this mandate is to increase the knowledge of substances with regards to their human and environmental impacts and to drive a shift towards less hazardous alternatives. These substances may be problematic in the manufacturing and end of life phase where workers or the environment can get exposed and can also migrate from the products during the use phase with unknown health effects as a result.

The mandate uses the hazard assessment and decision logic framework called GreenScreen™ for Safer Chemicals developed by the non-profit organization Clean Production Action (CPA). The GreenScreen methodology can be used for identifying substances of high concern and safer alternatives.

The GreenScreen criteria are in line with international standards and regulations including the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), OECD testing protocols and the European REACH Regulation. The U.S. EPA's Design for Environment (DfE) Alternatives Assessment is also an important influence on the GreenScreen™ for Safer Chemicals.

Definitions

Plastic parts are parts made mainly of plastics, e.g. the housing. Parts containing other materials in any significant amounts, e.g. cables with metal conductors, are not included in the definition.

Printed wiring board laminate is a printed board that provides point-to-point connections but not printed components in a predetermined configuration on a common base.

Licenced Profilers are organisations approved by CPA with the capacity to provide GreenScreen assessments.

Accepted substances are considered the most sustainable alternatives which are possible for the industry to use, also taking into consideration aspects such as availability and functionality. Accepted substances are found on the TCO Development website under *"Accepted Substances list"*.

Applicability

All Desktop computers.

Clarification

B.6.4.3

Mandate A.6.4.3:

Non halogenated flame retardants used in plastic parts that weigh more than 25 grams shall be on the publically available Accepted Substance List for TCO Certified. This means that the substance has been assessed by a licensed profiler according to GreenScreen™ and been assigned a benchmark score ≥ 2

The following acceptance decisions apply to substances given Benchmarks 4, 3, 2, 1 or designated U (undefined):

4: Accepted – (Few concerns)

3: Accepted – (Slight concern)

2: Accepted – (Moderate concern)

1: Not accepted - (High concern)

U: Not accepted - (Unspecified)

All substances of a flame retardant mixture shall be accounted for. Non-accepted components shall not exceed concentration levels of 0.1% by weight of the flame retardant.

Exempted are *printed wiring board laminates*, electronic components and all kinds of cable insulation.

A grace period for the above may be granted, see B.6.4.3 for rules

TCO Development will conduct spot-checks and require full disclosure of the flame retardants, including CAS number, used in the product to verify that the obligations according to this mandate are fulfilled.

Submit the following to an approved verifier:

A written guarantee that the above mandate is fulfilled. The guarantee shall be signed by the responsible person at the applicant company.

Submit the following together with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

A.6.4.4 Halogenated plastics

Background

PVC is by far the most common halogen containing plastic. There are however other plastics that contain halogens in the plastic itself. Halogens are problematic from both a health and environmental perspective throughout the product life cycle and should be phased out.

Definitions

Plastic parts are parts made mainly of plastics, e.g. the housing. Parts containing other materials in any significant amounts, e.g. cables with metal conductors, are not included in the definition.

Printed wiring board laminate is a printed board that provides point-to-point connections but not printed components in a predetermined configuration on a common base.

Halogens are a group of five chemically related non-metallic elements in the Periodic Table; fluorine, chlorine, bromine, iodine and astatine.

Applicability

All Desktop computers.

References

20 and 25.

Mandate A.6.4.4:

***Plastic parts* in the Desktop computer weighing more than 25 grams shall not contain intentionally added halogens as a part of the polymer.**

Note: *Printed wiring board laminates*, and all kinds of internal and external cable insulation are not considered to be part of *plastic parts* and are therefore not included in the mandate.

Submit the following to an approved verifier:

A written guarantee that the above mandate is fulfilled. The guarantee shall be signed by the responsible person at the applicant company.

Submit the following together with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

A.6.4.5 Phthalates

Background
Phthalates are substances mainly used as plasticizers. The substances restricted in the mandate are listed as Substances of Very High Concern and are included in REACH Annex XIV classified as toxic to reproduction. These substances are problematic from both a health and environmental perspective throughout the product life cycle and should be phased out.

Applicability
All Desktop computers.

Clarification
B.6.4.5

References
13, 14, 32, 33, 34 and 35

Mandate A.6.4.5:

The Desktop computer shall not contain Bis (2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP), and Diisobutyl phthalate (DIBP). No parts of the product are exempted.

Submit the following to an approved verifier:

A written guarantee that the above mandate is fulfilled. The guarantee shall be signed by the responsible person at the applicant company.

Submit the following together with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

A.6.4.6 Hazardous substances in product packaging

Background
Packaging constitutes a well-known environmental problem and is regulated in many countries worldwide. Packaging material has a short lifetime and generates large volumes of waste.

There are three main areas of concern, content of hazardous substances, use of resources and transport volume. These banned substances are problematic from both a health and environmental perspective throughout the package life cycle and should be phased out.

Applicability
All packaging material.

Clarification
B.6.4.6

References
31.

Mandate A.6.4.6:

The packaging material shall not contain lead (Pb), cadmium (Cd), mercury (Hg) or hexavalent chromium (Cr6).

Plastic packaging material shall not contain organically bound halogens.

Submit the following to an approved verifier:

A written guarantee that the mandate above is fulfilled. The guarantee shall be signed by the responsible person at the applicant company.

Submit the following together with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

A.6.5 Material Resource Efficiency

A.6.5.1 Lifetime extension

Background

A longer product lifetime makes a significant positive contribution to more efficient resource use as well as the reduction of air and water pollution. A pre-condition for prolonged lifetime is that the product is of high quality, which is supported by good warranties. Another requirement is the availability of spare parts for a number of years once the product is taken out of production. During this period, products should, if possible, be repaired and not replaced.

Definitions

Brand owner: The company or organization owning or controlling the *Brand Name*.
Brand Name: The name or sign, including but not limited to a trademark or company name, used to identify, amongst users and customers, the manufacturer or seller of a product.
Product Warranty is a period where the Brand owner offers to repair or replace broken products during a period of time at no charge.
Spare parts are those parts that have the potential to fail during normal use of the product. Product parts whose life cycle usually exceeds the average usual life of the product need not be provisioned as spare parts. When the cost for replacing a broken part (e.g. panel) exceeds the cost of replacing the whole product, then that part need not be considered as a spare part under this mandate.

Applicability

All Desktop computers.

Life Cycle Phases

Clarification

B.6.5.1

Mandate A.6.5.1:

1. **The *brand owner* shall provide a *product warranty* for at least one year on all markets where the product is sold.**

2. **The *brand owner* shall guarantee the availability of *spare parts* for at least three years from the time that production ceases. Instructions on how to replace these parts shall be available to professionals upon request.**

Submit the following to an approved verifier:

A written guarantee that the above mandate is fulfilled. The guarantee shall be signed by the responsible person at the *brand owner* company.

Submit the following together with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s) or "All products"
.....	.....
Signature	Name and title in block capitals
.....	.....
Date (Declaration valid 1 year from date)	Brand Owner Company

A.6.6 End of life

A.6.6.1 Material coding of plastics

Background
Prolonging the life of IT-products by reuse is the best way to minimize the environmental impact of IT-products. But when this is no longer possible it is important to facilitate material recycling of the products. Material coding of plastics aims at making the recycling of plastics easier so that the plastic can be used in new IT equipment.

Definitions
Plastic parts are parts made mainly of plastics, e.g. the housing. Parts containing other materials in any significant amounts, e.g. cables with metal conductors, are not included in the definition.

Printed wiring board laminate is a printed board that provides point-to-point connections but not printed components in a predetermined configuration on a common base.

Applicability
All Desktop computers.

Life Cycle Phase

Clarification
B.6.6.1

References
23, 28 and 29.

Mandate A.6.6.1:

Plastic parts weighing more than 25 grams shall be material coded in accordance with ISO 11469 and ISO 1043-1, -2, -3, -4.

Exempted are *printed wiring board laminates*.

The following information shall be submitted to an approved verifier:

A written guarantee that the above mandate is fulfilled. The guarantee shall be signed by the responsible person at the applicant company.

The following information shall be submitted with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

A.6.6.2 Take back system

Background

The amount of electronic waste in the world today is enormous and a growing environmental problem. It is important that manufacturers provide mechanisms to take back their equipment at end-of-life under the principle of individual producer responsibility wherein each manufacturer must be financially responsible for managing its own branded products at end-of-life. Currently much electronic waste is being exported to developing countries where it is managed unsustainably and disproportionately burdens those regions with this global environmental problem. The Basel Convention and its decisions govern the export of many types of electronic waste, however it is not properly implemented in all countries. With this mandate TCO Development aims to influence the expansion of better electronic waste management practices to more countries.

Definition

Brand owner: The company or organization owning or controlling the Brand Name.
Brand Name: The name or sign, including but not limited to a trademark or company name, used to identify, amongst users and customers, the manufacturer or seller of a product.
Take back system is a system that makes sure that the customer can return used products to be recycled. The system can be with or without a fee.

Environmentally acceptable recycling methods are:

- Product and component reuse
- Material recycling with secured handling of hazardous chemicals and heavy metals
- Pollution-controlled energy recovery of parts of the product

Applicability

All Desktop computers.

Clarification

B.6.6.2

References

30.

Mandate A.6.6.2:

The *brand owner* (or its representative, associated company or affiliate) shall offer their customers the option to return used products for *environmentally acceptable recycling methods* in at least one market where the product is sold and where electronics take back regulation is not in practice at the date of application.

The following information shall be submitted to an approved verifier:

The information stated in the list below shall be submitted and the guarantee signed by the responsible person at the *brand owner* company.

The following information shall be submitted with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

The requirement can be fulfilled by one of three options (to be verified):

☐ 1. Product only sold on markets with WEEE legislation or similar

☐ 2. World-wide product take back*

☐ 3. One additional market lacking WEEE legislation where product take back is offered*

Name of market…….

*The brand owner shall also submit a short description, to an approved verifier, of the take back system or reference to the representative, associated company or affiliate taking care of the take-back system

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s) or “All products”
.....	.....
Signature	Name and title in block capitals
.....	.....
Date (Declaration valid 1 year from date)	Brand Owner Company

A.6.6.3 Preparation for recycling of product packaging material

Background

Packaging constitutes a well-known environmental problem and is regulated in many countries worldwide. Packaging material has a short lifetime and generates large volumes of waste.

There are three main areas of concern, hazardous substance content, use of resources and transport volume.

Applicability

All packaging material.

Mandate A.6.6.3:

Non-reusable packaging components weighing more than 25 grams shall be possible to separate into single material types without the use of tools.

Exempted is reusable packaging.

The following information shall be submitted to an approved verifier:

A written guarantee that the mandate above is fulfilled. The guarantee shall be signed by the responsible person at the applicant company.

The following information shall be submitted with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

TCO DEVELOPMENT

DECLARATION FORM FOR TCO CERTIFIED DESKTOPS 5.0 ENVIRONMENTAL REQUIREMENTS

Applicant company

By signing this Declaration Form the Company confirm that the Company has read and accepts to be bound by the below listed environmental requirements as stated in this criteria document. The signature of this form is to be considered equal to a signature under each of the below listed individual mandates in this criteria document. The text in this form is compressed to save space so please make sure to read the full explanation under each mandate. Check the boxes for the documents that have been attached to this form.

A.1.1 TCO Certified Document
A.6.1 Product description
 Completed product declaration form
 Copy of the marking label for Desktop computer and External power supply
A.6.2.1 Environmental management system certification
 Addresses of manufacturing plants
 Valid EMAS certificate or ISO 14001 certificate
A.6.4.1 Cadmium, mercury, lead and hexavalent chromium
A.6.4.2 Halogenated substances
A.6.4.3 Non-halogenated substances
A.6.4.4 Halogenated plastics
A.6.4.5 Phthalates
A.6.4.6 Hazardous substances in product packaging
A.6.6.1 Material coding of plastics
A.6.6.3 Preparation for recycling of product packaging material

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s)
.....	.....
Signature	Name and title in block capitals
.....	.....
Date	Company

TCO DEVELOPMENT

DECLARATION FORM FOR TCO CERTIFIED DESKTOPS 5.0 ENVIRONMENTAL REQUIREMENTS

Brand owner

By signing this Declaration Form the Company confirm that the Company has read and accepts to be bound by the below listed environmental requirements as stated in this criteria document. The signature of this form is to be considered equal to a signature under each of the below listed individual mandates in this criteria document. The text in this form is compressed to save space so please make sure to read the full explanation under each mandate. Check the boxes for the documents that have been attached to this form.

A.6.5.1 Lifetime extension

A.6.6.2 Take back system

□ 1. Product only sold on markets with WEEE legislation or similar

□ 2. World-wide product take back*

□ 3. One additional market lacking WEEE legislation where product take back is offered*

*□ Short description or reference of the above

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s) or “All products”
.....	.....
Signature	Name and title in block capitals
.....	.....
Date (Declaration valid 1 year from date)	Company

A.7 Socially responsible manufacturing

Shorter product cycles and growing demand for new technologies put increasing pressure on industry and its complex supply chain to deliver new devices faster and at a low cost. The result is often inadequate working conditions at manufacturing facilities, long working hours, low wages and a lack of health and safety measures.

TCO Development aims for greater brand engagement throughout the supply chain by setting criteria and verification routines that create strict social policies toward suppliers, as well as factory audit structures and an open dialog within the IT industry.

Life Cycle Phase

A.7.1 Supply chain responsibility

Background
It is TCO Developments opinion that codes of conducts and factory audits are currently the tools that are most practical to help the majority of brands to work with socially responsible manufacturing in a structured way. It is also TCO Developments opinion that these tools are improving the situation incrementally as long as they are used in the correct and committed way by the brand.

The contribution of TCO Certified is:

- TCO Certified defines a minimum level of the Brand owner's code of conduct.
- TCO Certified is a control system to ensure that the brand takes the responsibility and work in a structured way in accordance with their code of conduct.
- TCO Certified creates an incentive for Brand owners to work proactively.

Definitions
Brand owner: The company or organization owning or controlling the Brand Name.
First tier manufacturing facility: Manufacturing plant where the final assembly of the TCO certified product is taking place.
Corrective action plan: A list of actions and an associated timetable detailing the remedial process to address a specific problem

Applicability
The Brand owner.

Clarification
B.7.1

References
15 and 16

Mandate A.7.1:

By signing this mandate the Brand owner agrees to the (1. Commitment) and agrees to conduct the (2. Structured work). Additionally TCO Development requires that the Brand owner show (3. Proof) of the commitment and the structured work by allowing random inspections, by sharing audit reports and corrective action plans and by providing other documented proof described below.

1. Commitment:

The *Brand owner* shall have a code of conduct that is considered consistent with the following in the manufacturing of TCO Certified products:

- **ILO eight core conventions: 29, 87*, 98*, 100, 105, 111, 138 and 182.**
- **UN Convention on the Rights of the Child, Article 32.**
- **Relevant local and national Health & Safety and Labour laws effective in the country of manufacture.**

***In situations with legal restrictions on the right to freedom of association and collective bargaining, non-management workers must be permitted to freely elect their own worker representative(s) (ILO Convention 135 and Recommendation 143).**

2. Structured work:

- **The Brand owner shall ensure that routines are in place to implement and monitor their code of conduct in the manufacturing of TCO Certified products.**
- **In the final assembly factories the Brand owner shall ensure the implementation of their code of conduct through factory audits.**
- **In the final assembly factories and in the rest of the supply chain the Brand owner shall ensure that a corrective action plan is developed and fulfilled within reasonable time for all violations against their code of conduct that the Brand owner is made aware of.**

3. Proof:

- **TCO Development may conduct/commission random factory inspections (spot-checks) at any final assembly factory manufacturing TCO Certified products for the Brand owner and may require full audit reports during the certification period in order to assess social commitment and advancement.**
- **TCO Development may also require seeing corrective action plans and auditing reports from factories further down the supply chain to ensure that corrective actions have been successfully implemented.**
- **TCO Development additionally requires the documentation below to be verified by a third party approved verifier.**

Submit the following to an approved verifier:

The Brand owner shall submit all of the following as proof of their commitment and structured work:

1. **The Brand owner shall submit their code of conduct, which must be considered consistent with the criteria under 1. Commitment.**
2. **The Brand owner shall annually submit proof that management and workers at all final assembly factories manufacturing TCO Certified products have been informed about the Brand owner's code of conduct.**
3. **The Brand owner shall annually submit a list of all final assembly factories manufacturing TCO Certified products. This list shall include the dates of the most recent social audits covering the Brand owner's code of conduct and the dates of planned audits for each factory. The list shall show that all factories have or will be audited at least once over a 3-year period.**
4. **The Brand owner shall annually submit for review one third party audit report from one final assembly factory manufacturing TCO Certified products to demonstrate that the audits are conducted in a serious manner. The audit report shall at least cover the criteria in A.7.1 of TCO Certified and be of equal quality as an EICC audit. It shall not be more than 12 months old.**
5. **The Brand owner shall submit a corrective action plan for all nonconformities against A.7.1 of TCO Certified found in the submitted third party factory audit.**

If this is the first time the *Brand owner* certifies products to this generation of the criteria and time is needed to develop the proof above then the Brand owner can seek a 12 months grace period on the first application. TCO Development reserves the right to deny grace period if the Brand owner is considered a high risk for not meeting the 12 month due date. When seeking grace period an agreement must be completed/signed by the senior management representative at the *Brand owner* company.

The following information shall be submitted to an approved verifier:

- **A written guarantee that the mandate above is fulfilled. The guarantee shall be signed by the responsible person at the *brand owner* company.**

Submit the following together with the application to TCO Development:

- **A copy of a verification report from a verifier approved by TCO Development.**

We hereby guarantee our commitment to fulfilling the mandate.

……	……
Product brand name	Model name(s) or "All products"
.....	.....
Signature	Name and title in block capitals
.....	.....
Date (Declaration valid 1 year from date)	Brand Owner Company

A.7.2 Senior Management Representative

Background
It is beneficial to all parties that an open and transparent dialogue between TCO Development and the Brand owner exists for the monitoring of compliance with the criteria or when issues concerning working conditions at manufacturing facilities require clarification. A contact person responsible for the organization's efforts to enforce the social responsible manufacturing criteria needs to be consistently available for dialogue with TCO Development throughout the validity of the certificate.

Applicability
The Brand owner.

Clarification
B.7.2

Mandate A.7.2:

The Brand owner shall have an appointed Senior Management Representative (SMR) who, irrespective of other responsibilities, has the authority to ensure that the social criteria in the manufacturing of TCO Certified products are met and who reports directly to top management.

- **The contact details of the SMR shall be submitted and the SMR shall be available for dialogue in English with TCO Development throughout the validity of all the Brand owners' certificates.**
- **To ensure that the SMR has the necessary authority and is working in a structured and proactive way implementing the code of conduct, a review of the SMR shall be done every year according to B.7.2.2.**

Submit the following to an approved verifier:

1. **Name, Title, Telephone Number and Email Address of the SMR.**
2. **A written guarantee that the above mandate is fulfilled. The guarantee shall be signed by the SMR at the Brand owner company.**

Submit the following together with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

Complete the table using block lettering

Name	
Business title	
Telephone	
E-mail	

We hereby guarantee that the above mandate is fulfilled.

…… Product brand name

…… Model name(s) or "All products"

..... Signature

..... Name and title in block capitals

..... Date (Declaration valid 1 year from date)

..... Brand Owner Company

A.7.3 Conflict minerals

Background

The exploitation and trade of the natural resources, Tantalum, Tin, Tungsten and Gold (3T+G) from conflict-affected areas is commonly regarded as a major source of conflict financing. TCO Development supports the underlying goal of the EU conflict minerals measures and those contained in the Dodd Frank Act 1502, but believe it is also vital to support in-region responsible sourcing programs in order to help suppliers meet these due diligence requirements, maintain trade and develop mining that directly benefits the people whose livelihoods depend on a legitimate trade. TCO Development now requires all Brand owners who use TCO Certified to address the issue of conflict minerals in their certified products in a progressive and proactive way.

Definitions

Conflict minerals: Tantalum, Tin, Tungsten and Gold = 3T+G
DRC: Democratic Republic of the Congo

Applicability

The Brand owner.

Clarification

B.7.3

Reference

17

Mandate A.7.3:

The Brand owner shall have a public conflict minerals policy and also indicate all the initiatives they are using/funding. It is TCO Developments opinion that the OECD Due Diligence Guidance for Responsible Supply Cain of Conflict-Affected or High-risk Areas is the most ambitious approach in the list.

At least one of the following options shall be marked:

- ☐ **A Due Diligence process based on the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected or High-risk Areas**
- ☐ **iTSCi (International Tin Research Institute (ITRI) Tin Supply Chain Initiative).**
- ☐ **CFTI (Conflict-free Tin Initiative).**
- ☐ **PPA (The Public-Private Alliance for Responsible Minerals Trade).**
- ☐ **Other relevant DRC in-region initiative:……**
- ☐ **CFSI (EICC/GeSi Conflict-Free Sourcing Initiative).**

Submit the following to an approved verifier:

1 **The completed TCO Certified Conflict Minerals Questionnaire and supporting documents**

2 **A written guarantee that the above mandate is fulfilled. The guarantee shall be signed by the responsible person at the Brand owner company**

Submit the following together with the application to TCO Development:

A copy of a verification report from a verifier approved by TCO Development.

We hereby guarantee that the above mandate is fulfilled.

……	……
Product brand name	Model name(s) or ”All products”
.....	.....
Signature	Name and title in block capitals
.....	.....
Date (Declaration valid 1 year from date)	Brand Owner Company

TCO DEVELOPMENT

R References

International standard organisations referred to in the reference list below and their Web sites.

- ASTM, American Society for Testing and Materials, http://www.astm.org/
- CIE, Commission Internationale de l'Eclairage, International Commission on Illumination, www.cie.co.at/cie/
- DIN, Deutsches Institut für Normung e. V., www2.din.de
- EBU, European Broadcasting Union, http://www.ebu.ch/tech_info.html
- IEC, International Electrotechnical Commission, www.iec.ch
- ISO, International Organization for Standardization, http://www.iso.org/
- ITU, International Telecommunication Union www.itu.int/home/index.html
- SMTPE, Society of Motion Picture Television Engineers, www.smtpe.org
- VESA, Video Electronics Standards Association, www.vesa.org

1. The most recent TCO Certified criteria document available at http://www.tcodevelopment.com
2. Nordic Guidelines for Computer Accessibility, Second edition, 1998. Nordic Co-operation on Disability. Editor: Claes Thorén.
3. ISO 7779:2010, Acoustics – Measurements of airborne noise emitted by computer and business equipment. This international standard is based on ECMA-74.
4. ISO 3741:2010, Acoustics – Determination of sound power levels of noise sources using sound pressure – Precision methods for reverberation rooms.
5. ISO 3744:2010, Acoustics – Determination of sound power levels of noise sources using sound pressure - Engineering method in an essentially free-field condition over a reflecting plane.
6. ISO 3745:2003, Acoustics – Determination of sound power levels of noise sources – Precision methods for anechoic and semi anechoic rooms.
7. ISO 11201:2010, Acoustics – Noise emitted by machinery and equipment – Measurement of emission sound pressure levels at a work station and other specified positions – Engineering method in an essentially free field over a reflecting plane.
8. ISO 9296:1998, Acoustics – Declared noise emission values of computer and business equipment.
9. Standard ECMA-74 8th edition, Measurement of Airborne Noise Emitted by Information Technology and Telecommunications Equipment.
10. EN 60950-1 (IEC 60950-1). Safety of information technology equipment including business equipment.
11. EMAS EU regulation no 761/2001 concerning the voluntary participation of industrial companies in the Union's environmental control and review structure.

12. ISO 14001 Environmental management systems - Specification with guidance for use
13. GovTrack.us. "H.R. 4040--110th Congress (2007): Consumer Product Safety Improvement Act of 2008, GovTrack.us (database of federal legislation) . Retrieved 14 August 2009.
14. ECHA Website - Proposal for identification of Substances of Very High Concern
15. Electronic Industry Citizenship Coalition (EICC), http://www.eicc.info
16. SA8000, http://www.sa-intl.org
17. ENERGY STAR® Program Requirements for Computers
18. International Efficiency Marking Protocol for External Power Supplies
19. EU Directive 2006/66/EG on batteries and accumulators containing certain dangerous substances
20. EU Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment
21. Proposal for an EU Directive 2003/0282 (COD) on batteries and accumulators and spent batteries and accumulators
22. Regulation concerning Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), EC 1907/2006
23. EU Directive 67/548/EEC on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances
24. EU Directive EC 1272/2008 on classification, labelling and packaging of substances and mixtures
25. The EU Green Paper “Environmental questions concerning PVC” KOM (2000) 469
26. EU Directive 91/155/EEC and amendments defining and laying down the detailed arrangements for the system of specific information relating to dangerous preparations
27. EU Directive 93/793/EEC on the evaluation and control of the risks of existing substances
28. ISO 11469 Plastics - Generic identification and marking of plastics products
29. ISO 1043-1, -2, -3, -4 Plastics - Symbols and abbreviated terms
30. EU Directive 2002/96/EC on waste electrical and electronic equipment (WEEE)
31. Directive 94/62/EC on packaging and packaging waste.
32. http://www.umweltbundesamt.at/fileadmin/site/umweltthemen/abfall/ROHS/finalresults/Annex6_RoHS_AnnexII_Dossier_DEHP.pdf [DEHP]
33. http://www.umweltbundesamt.at/fileadmin/site/umweltthemen/abfall/ROHS/finalresults/Annex7_RoHS_AnnexI I_Dossier_BBP.pdf [BBP];
34. http://www.umweltbundesamt.at/fileadmin/site/umweltthemen/abfall/ROHS/finalresults/Annex8_RoHS_AnnexI I_Dossier_DBP.pdf [DBP].
35. http://rohs.exemptions.oeko.info/fileadmin/user_upload/reports/20140520_DIBP_AnnexII_Dossier_final.pdf [DIBP].
36. http://www.oecd.org/corporate/mne/mining.htm

B Test Methods and clarifications

The following definitions, test conditions, requested specifications from clients, and other information apply to the test methods described in this document.

Test results are valid only for the presentation form(s) and configuration(s) tested.

B.0 General test conditions

B.0.1 Definition of a test object

- Test objects covered by this document are different styles of computer such as Desktop or Desk-side (Tower)
- The testing procedures are the same and so as to simplify the instructions in this Section of the document, both styles will be referred to as EUT (Equipment under Test).
- A test object with all necessary information for its operation shall be delivered to the to the test facility in test-ready condition including any required accessories. All necessary information about how to operate and adjust the test object shall be provided.
- The performance of the EUT shall in all aspects be fully in accordance with the performance of the final product.

B.0.2 Required test object information

- The client shall specify the name(s), type designation(s) and manufacturer for all different exchangeable parts of the test object.
- The client shall specify the name, type designation and manufacturer of the graphics card. This information shall be written in the test report.
- The graphics card used for testing shall not be used for more than the test object during the test, if not stated by the client.
- The EUT used to run the display shall not use any unnecessary software or hardware that could influence the test.

B.0.3 Conditions for the EUT

- The EUT shall be physically prepared for testing and shall be warmed up for 30 minutes before testing.
- All testing shall be performed with the EUT connected to a VDU of FPD type certified in accordance with the most recent version TCO standard for displays. The monitor shall be adjusted and display an image as specified in each relevant part of the display standard.

- The wiring connecting the EUT with the display, and the display's own power supply arrangements shall be arranged in a way that the influence on the performed measurements is minimized.
- Only equipment that is necessary for the functionality of the EUT should be connected to such external ports as USB and Fire Wire, unless stated by the manufacturer.
- The EUT shall be tested under nominal conditions of input voltage, current, etc. If sold on different markets, one setup shall be chosen by the manufacturer which shall represent the conditions of the country there the product shall be sold the most.
- When possible testing shall be done with the digital signal input. In the case of several digital inputs the one with the lowest bandwidth which can still support the native resolution shall be used. The same signal input shall be used for testing of all parameters. The signal input used shall be specified in the test report.

B.0.4 Instruments used for testing

All instruments used for testing the EUT shall be of good quality and validated by a recent test certificate from a certified testing facility. Any necessary instrument calibration shall be done before the tests are performed. Calibrations shall be traceable to national standards

B.0.5 Settings of the EUT

- All test images can be found on the home page of TCO Development, www.tcodevelopment.com.
- The default testing 12 point Arial font and 100% "zoom/magnification" shall be used. The latest version of MS Windows operating system is the default user interface, if not otherwise stated. For Macintosh computers, Mac OS can be used during testing. The operating system most likely to be used by an end user should be used for testing.
- No programs to enhance the image quality or in any other way improve the results should be run on the EUT during test unless they are intended to be delivered with the final product.
- The CPU, GPU and memory clock frequencies should be set by the manufacturer as intended for the end user.
- All chassis modifications such as dust filters, perspex windows or extra fans are to be installed as intended for the end user.

B.0.6 Test report

- The test results are valid only for the presentation form(s) and configuration(s) tested. If other configurations are accepted by the test facility based on the results of the tested ones it shall be clearly specified in the test report that these configurations have not been tested.
- Any changes to the test methods shall be stated in the test report.
- The manufacturer, brand name, model type and serial number, if available, shall be stated in the test report.
- The supply voltage and frequency used during the test and the electrical safety classification CLASS I or CLASS III shall be stated in the test report.
- The degree of uncertainty for each given measurement result shall be stated in the test report.
- Photographs of the product showing: Front, side, rear, a legible marking label and if applicable the external power supply with legible marking label.

B.1 General Information

B.1.1 Information to end users

The TCO Certified Document shall accompany the product as provided by TCO Development. No editorial changes without TCO Development's consent are accepted. The Document is available at www.tcodevelopment.com.

If the product that is to be TCO Certified is branded differently from the applicant name, the applicant company signing the guarantee shall be sure that the brand owner agrees with the requirement.

Compliance is through one of the following options:

1. Separate printed document
   The TCO Certified Document is placed in the packaging and accompanies the product to the end user

2. In the user manual or a digital file
   The TCO Certified Document is placed in the user manual or a digital file and accompanies the product to the end user. The TCO Certified Document shall be printed under a headline for TCO Certified. This headline shall be visible in the table of contents of the user manual or digital file.
   The TCO Document must be separated from other text portions of the user manual or digital file so that it is obvious that the TCO Document is not accountable for the content of any other texts.

3. On the brand owner web site.
   A direct link to the TCO Certified Document on the brand owner's web page is placed in the user manual or digital file and accompanies the product to the end user. There shall be a headline for TCO Certified in the user manual or digital file. This headline shall be visible in the table of contents. With this headline there shall be a direct link to the TCO Certified document on the brand owner's website. Also accepted are TCO logos or icons that redirect the visitor by a link to the TCO Certified Document

Back to A.1.1

B.4 Emissions

B.4.0 General test conditions for emissions

B.4.0.1 Basic test requirements

As described in section B.0.

For the test methods for emissions described in this document the following conditions apply:

- AC mains voltage* 230 VAC RMS, tolerance ≤ 1 %
- AC mains frequency* 50 Hz, tolerance ≤ 2 %
- Test room temperature 23±3 ºC
- Humidity 20-75 % RH (non condensing)

The EUT shall be connected to phase and neutral.

* – or other voltage and frequency combination specified by the client.

B.4.0.2 Conditions and set up for the test object

The tests on the EUT shall be performed with the full screen size of the connected display activated. The display shall be in its default setting and show a full screen of capital “H” pattern in dark/black letters on an illuminated background (positive polarity).

The EUT shall be connected to mains via a mains cord. The measurement shall be performed with a shielded mains cord, (connected to earth for a CLASS I device). Shielded power cords have the text “shielded” printed on them. The shielding shall be of such quality that when the cable is measured by itself, hanging in its correct position at the turn table but with the test sample removed, the values shall be below the accepted background level (2.0 V/m in band I and 0.20 V/m in band II).

EUTs without an external power supply shall be connected to mains via the above mentioned power cable, which shall run from the point of its connection on the EUT horizontally straight to a point 0.4 m behind the front of the EUT. The cable shall then from this point run downwards at least 1 m. – see figure B.4.0.2.1 However, the cable at this vertical drop should never be closer than 0.1 m to the back of the EUT. So for an EUT with a depth (front to back) ≥ 0.3 m the distance 0.1 m from the back is used instead of 0.4 from the front.

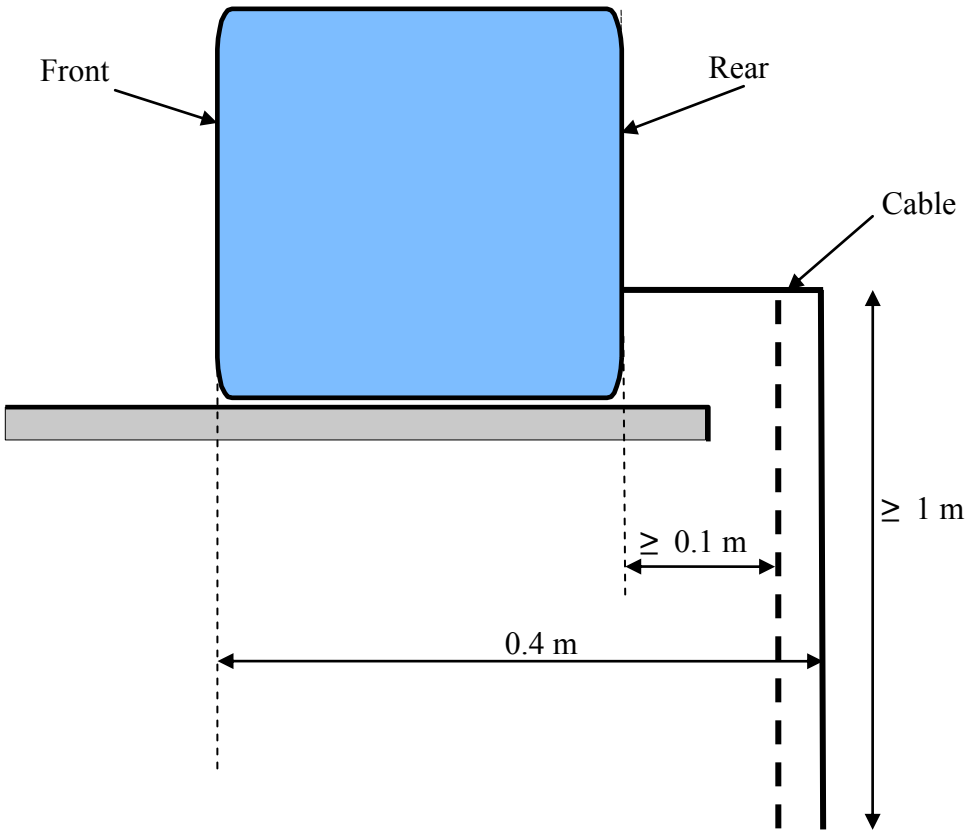


Figure B.4.0.2.1 EUT without external power supply and a depth of < 0.3 m.

An external power supply unit can contribute to the electromagnetic fields around the EUT. Power supply units, which are connected via a primary cable to the outlet, shall be positioned centrally, directly behind the test sample, on the (turn)table, with the secondary side towards the EUT, see Figure B.4.0.2.2 The primary cable shall extend horizontally, on the (turn)table to a point 0.4 m behind the front of the EUT. The cable shall then, from this point run downwards for at least 1 m. However, the cable at this vertical drop should never be closer than 0.1 m to the back of the EUT. So for a large EUT the distance 0.1 m from the back is used instead of 0.4 from the front. If the power supply can be positioned with different sides up, it shall be tested in all positions and the worst case shall be used. However, if it is obvious which side is intended to be the top side or bottom side by the placement of LED indicator or integrated supports to stand on, it is enough to test the power supply in the one intended position.

The secondary cable of the power supply shall run the shortest distance from the point of its connection on the EUT to the secondary side of the power supply. The unused portion of the secondary cable, if any, shall be bundled together with the power supply unit. The bundle loops shall have a length equal to the longest dimension of the power supply. For supply units with dimensions less than 0.1 m; a 0.1 m bundle loop length shall be used.

For power supply units which are designed to be put directly in the outlet, without a primary cable, the secondary cable shall run vertically down to the (turn)table from the point of its connection on the EUT and then horizontally straight to a point 0.4 m behind the front of the EUT. The cable shall then, from this point, run downwards at least 1 m.

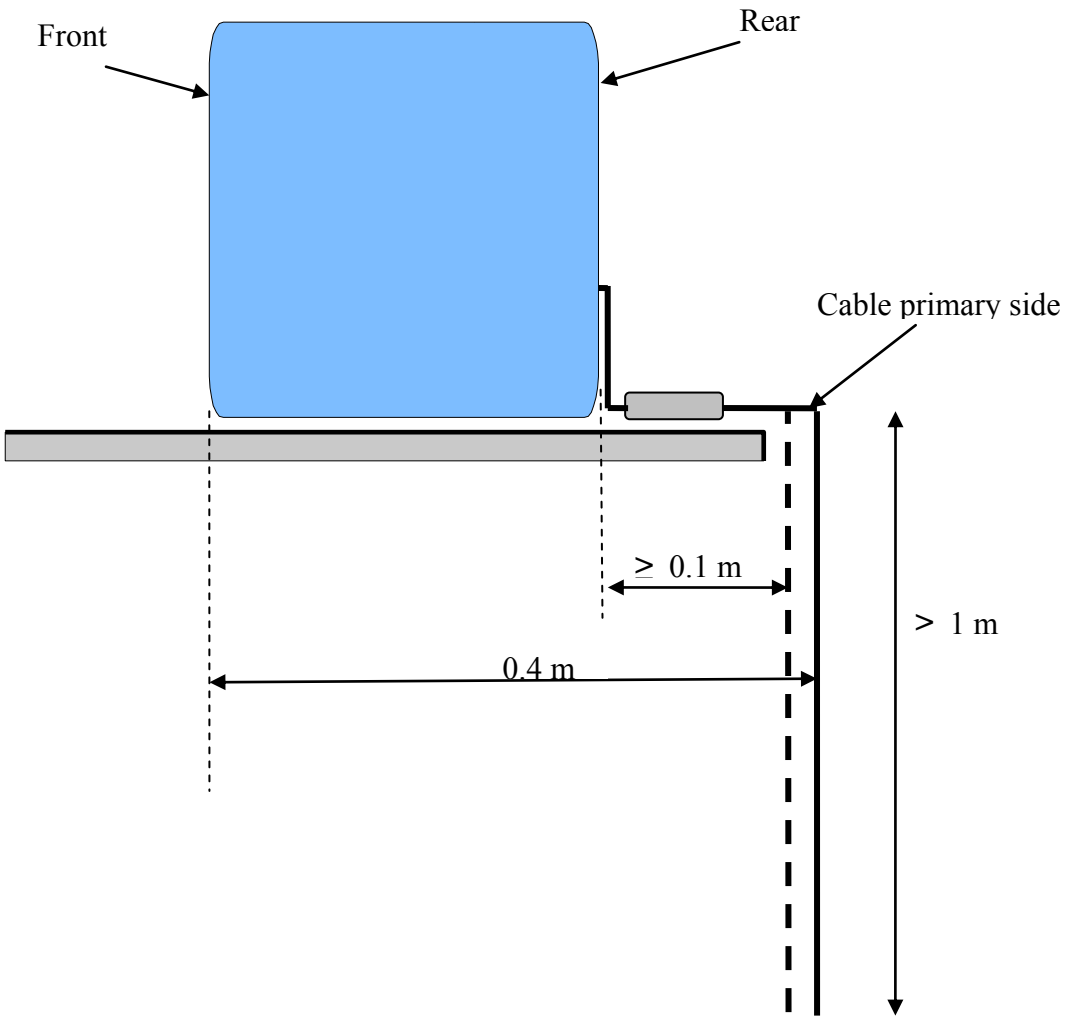


Figure B.4.0.2.2 EUT with external power supply.

For measurements of alternating magnetic fields (B.4.2) the power cable may be positioned in another way, as the cable contributes a negligible amount to the magnetic field. However external power supplies must be correctly positioned, as they may give rise to magnetic fields.

If positioning in accordance with the above rules is not possible, the positioning of the supply unit and cables shall be described in the test report.

B.4.0.3 Emission measurement instruments

The instruments used for emission testing shall comply with the requirements and calibration procedures described below:

Alternating electric field meter

The alternating electrical field emission from the EUT shall be determined by measuring the displacement current passing a given surface of the measuring probe. The probe consists of a disc of double sided printed circuit board laminate with a diameter of 300 mm. On the front of the board the copper layer is removed in the annulus between radii 50 and 52 mm, see Figure B.4.0.3.1.

The copper foil surrounded by the annulus is the active measuring surface. It is connected to one input terminal of an operational amplifier, with capacitive feedback. The other input terminal of the operational amplifier, the copper ring outside the active surface, and the back of the board are connected to ground. The output voltage (U) from the probe (active surface with area (A)) is related to the incident electrical field, E, averaged over the active surface in accordance with $U = \varepsilon \cdot E \cdot A/C$ where C is the capacitance in the feedback loop of the operational amplifier and ε is the permittivity for a vacuum.

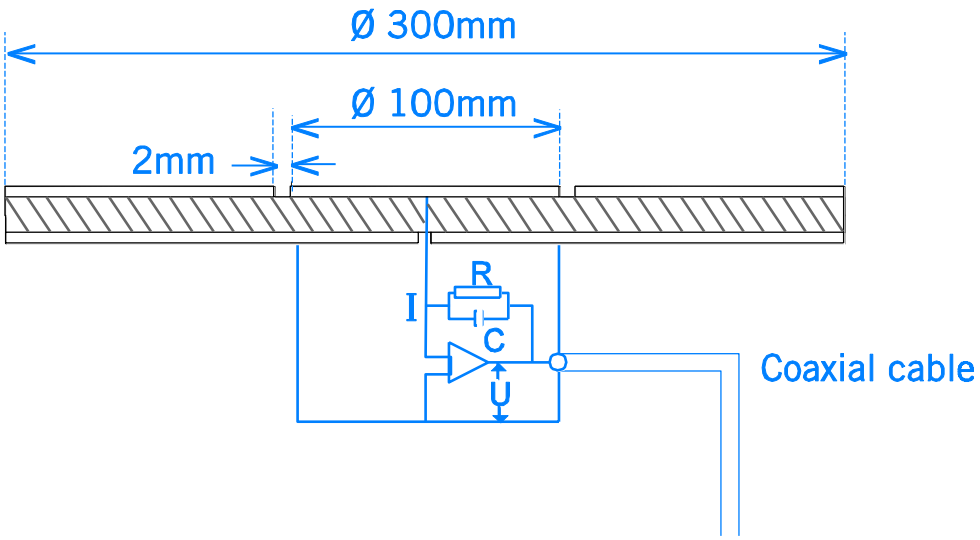


Figure B.4.0.3.1 Sketch and circuit principle of the Alternating electric field meter for alternating electrical field measurements. The feedback circuit of the operational amplifier is a capacitance C in parallel with a high value resistor R to ensure that there is no DC voltage across the plates of the capacitor C.

The specifications for the frequency response of the alternating electric field meter are given by the calibration procedure. The signals from the probe shall be filtered by high-pass and low-pass filters. The specification of the filters is given in Table B.4.0.3.1.

Table B.4.0.3.1 Filter specifications

Frequency Band I					
Frequency	< 5 Hz	5 Hz	100 Hz	2 kHz	> 2 kHz
Attenuation	> 80 dB/decade	3 dB	0 dB	3 dB	> 40 dB/decade

Frequency Band II					
Frequency	< 2 kHz	2 kHz	30 kHz	400 kHz	> 400 kHz
Attenuation	> 80 dB/decade	3 dB	0 dB	3 dB	> 40 dB/decade

After amplification and filtering the output voltage of the measuring probe shall be used to determine the r.m.s. value of the electric field strength in both frequency bands.

The measuring time shall be sufficiently long to enable measurements with an accuracy of ± 5 % at 50/60 Hz.

The measuring system shall be capable of measuring at least down to 2.0 V/m in Band I and down to 0.20 V/m in Band II.

The measuring probe shall be calibrated using a parallel plate capacitor (air dielectric) consisting of the measuring probe and a metal plate of at least 300 mm diameter. The distance between the surface of the probe and the plate shall be 30 mm.

The calibration shall be performed with sinusoidal fields at the amplitudes and frequencies specified in Table B.4.0.3.2.

Table B.4.0.3.2 Calibration frequencies and amplitudes

	Frequencies	**Amplitude**
Band I	50, 100, 500, 1000 Hz	10, 25 V/m
Band II	15, 30, 60,120 kHz	1.0, 2.5, 10 V/m

Recorded values at these calibration points shall be within ± 5 % of the nominal value. Due to the nature of the specified filters the deviation shall be calculated at 1 kHz from 9.5 and 22.5 V/m and at 120 kHz from 0.95, 2.4 and 9.5 V/m.

Alternating magnetic field meter in Band I and Band II

The magnetic field shall be measured using coil systems that shall consist of three mutually perpendicular concentric circular coils each with an area of 0.01 m^2. The coils may depart from a circular shape where they intersect. The minimum inner diameter shall be 110 mm and the maximum outer diameter 116 mm. The measuring coils shall not be sensitive to electric fields.

The resonance frequency of each coil appropriately connected to cables and amplifiers shall not be so low that it may influence the specified frequency response according to table B.4.0.3.1.

Amplifiers and integrating networks to make the output voltage proportional to the magnetic flux density and independent of frequency shall follow each coil. The specifications in respect of the frequency response are given in the calibration procedure.

High-pass and low-pass filters shall filter the signals from the coil systems. The specifications of the filters are given in Table B.4.0.3.1.

After amplification, integration and filtering, the signals from the three coils in each coil set shall be used as input values for calculating the r.m.s. values of the amplitudes of the magnetic flux density vectors in both frequency bands. It is permissible to calculate the r.m.s. value for each of the coil signals and use the root of the squared sum of those r.m.s. values as the test result.

The measuring time shall be sufficiently long to enable measurement with an accuracy of ±_5 % at 50/60 Hz.

The alternating magnetic field meter in Band I and Band II shall be capable of measuring down to at least 40 nT in Band I and down to 5.0 nT in Band II.

The alternating magnetic field meter in band I and band II shall be calibrated using a Helmholtz-type calibration coil as shown in the Figure B.4.0.3.2. Calibration set-up: Calibration shall be performed with sinusoidal fields at the amplitudes and frequencies specified in Table B.4.0.3.3.

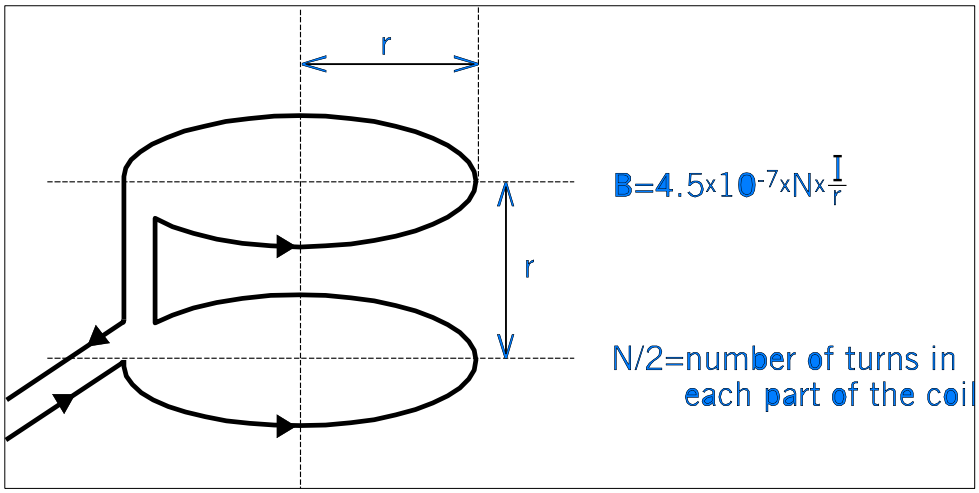


Figure B.4.0.3.2. Calibration using a Helmholtz-type calibration coil.

Table B.4.0.3.3 Calibration frequencies and amplitudes

	Frequencies	**Amplitudes**
Band I	60, 100, 500, 1000 Hz	200, 2000 nT
Band II	15, 30, 60, 120 kHz	25, 250 nT

Recorded values for these calibrations shall not deviate more than ± 5 % from the nominal value. Due to the nature of the specified filters the deviation at 1 kHz shall be calculated from 180 nT and 1800 nT and at 120 kHz from 24 nT and 240 nT.

The calibration shall be performed for each of the three individual coils separately exposed and for one situation where approximately the same flux density passes through all three coils.

B.4.1 Alternating electrical fields

B.4.1.0 Test facility requirements

Background electric field strengths in the test facility, including disturbances transmitted by power lines and internally generated noise in the measuring system, shall together not exceed 2.0 V/m in Band I and 0.20 V/m in Band II.

The mains voltage to the EUT under test shall be within ± 3 % of its nominal value.

B.4.1.1 Preparation of the EUT for testing

All necessary preparations described in B.0 and B.4.0 shall be done.

B.4.1.2 Equipment

Alternating electric field meter

B.4.1.3 Test Method

The EUT shall be positioned at a horizontal surface. The origin of a cylindrical co-ordinate system is chosen to be situated at the centre of an imaginary box just covering the EUT. The z-axis is chosen to be at a right angle to the horizontal plane. The angular reference direction is parallel to the horizontal plane and through the centre, centre point of the front of the EUT. An angle (º) is positive in the counter-clockwise direction.

The true r.m.s. value of the amplitude of the electric field strength, at the surface of the measuring probe, is measured in front of the test object in Band I and in four azimuths in Band II at 0º, 90º, 180º, 270º. All measurements shall be taken at 0.5 m from an imaginary box covering the surface of the product. The measurement instrument is moving in a counter-clockwise direction around the test sample (as illustrated in the figure B.4.1.3.1).The frequency ranges are selected by means of filters in the measuring equipment.

Distances are given in meters and angles in degrees. The co-ordinates are given for the centre of the measuring probe. The surface of the probe shall be perpendicular, within ± 5°, to the radial axis.

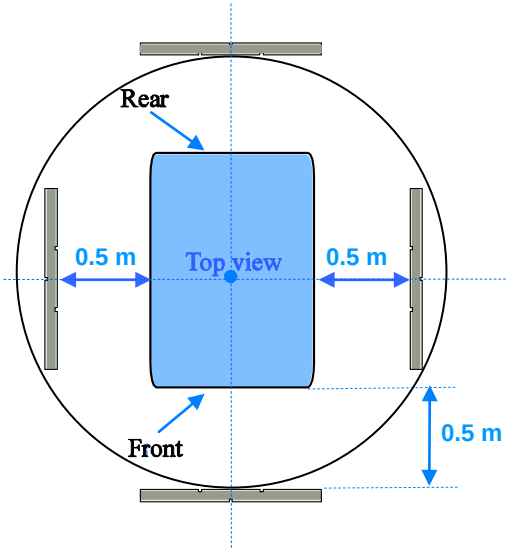


Figure B.4.1.3.1. Measurement geometry for Band I and Band II.

The EUT and the measuring probe shall be positioned at least 1 m from all significant metallic structures and objects.

Additional units and connecting cables necessary for the operation of the EUT, which are not part of the test, shall be placed so far away from the measuring setup that the fields they emit do not influence the measurement. Shielding may be added to these units and cables, as long as the 1 m clearance is maintained.

The measuring probe shall be connected to ground. Any eventual cables running between the measuring probe and the measuring instrument shall be positioned in such a way that they do not influence the measured value.

The power cable of the EUT shall be connected to the phase and the neutral conductors of the mains power supply. If the mains power supply plug permits an interchange of the live and neutral conductors, measurements shall be taken with the connection that gives the highest reading in Band I.

B.4.1.4 Test evaluation

Results shall be presented as r.m.s. values of the alternating electric field expressed in volt per meter (V/m). For Band I, results shall be presented as the measured values for normal and stand-by operations if they differ. For Band II, the measured values in front of the EUT and the maximum value at rotation shall be presented for normal and stand-by operations if they differ.

If the measured values are less than 10.0 V/m in Band I or less than 1.0 V/m in Band II the result shall be reported as "<_10.0 V/m" or "<_1.0 V/m" respectively.

B.4.1.5 Overall uncertainty

The test shall be performed in such a way that the total extended uncertainty in the test result will be less than ± (10 % of the reading + 1. 5 V/m) for Band I and ± (10 % of the reading + 0. 1 V/m) for Band II.

Back to A.4.1

B.4.2 Alternating magnetic fields

B.4.2.0 Test facility requirements

Background magnetic fields in the test facility, including disturbances transmitted along the power line and internally generated noise in the measuring system, shall together not exceed 40 nT in Band I and 5 nT in Band II.

B.4.2.1 Preparation of the EUT for testing

All necessary preparations described in B.0 and B.4.0 shall be done.

B.4.2.2 Equipment

Alternating magnetic field meter in Band I and Band II

B.4.2.3 Method

The true r.m.s. value of the amplitude of the magnetic flux density vector is measured at 12 points on a cylindrical surface around the test object in the two frequency ranges, Band I and Band II. The frequency ranges are selected by specified filters in the alternating magnetic field meter.

The measuring geometry is illustrated in Figure B.4.2.3.1.The measurement points are mathematically defined in the following way.

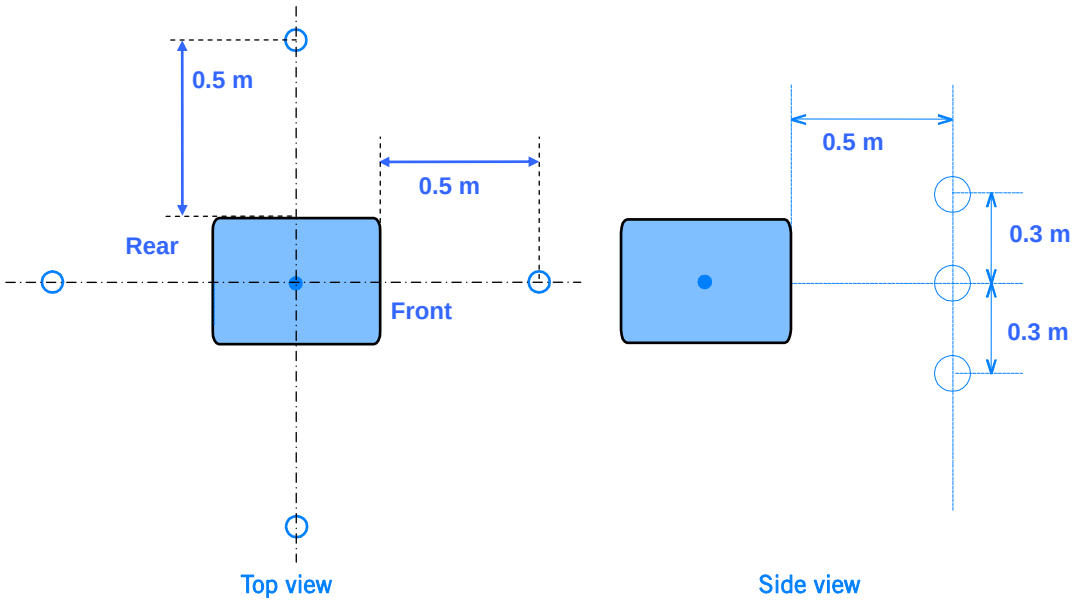


Figure B.4.2.3.1. Measurement geometry for the EUT.

The EUT shall be positioned at a horizontal surface. The origin of a cylindrical co-ordinate system is chosen to be situated at the centre of an imaginary box just covering the EUT. The z-axis is chosen to be at a right angle to the horizontal plane. The angular reference direction is parallel to the horizontal plane and through the centre, centre point of the front of the EUT. An angle (º) is positive in the counter-clockwise direction.

The test co-ordinates are taken in four directions around the EUT at 0°, 90°, 180° and 270°. Measurements shall be made at these points 0.50 m from an imaginary box just covering the outer surface of the EUT. The measurement instrument is moving in a counter-clockwise direction around the test sample (as illustrated in the figure B.4.2.3.1).

Distances are given in metres and angles in degrees.

The measuring coils shall be stationary during the measurements.

The power cable of the test object shall be connected to the phase and the neutral conductors of the mains power supply. The EUT does not need to be measured with the phase and neutral interchanged in this case, as the magnetic fields are not influenced by such a change.

B.4.2.4 Test evaluation

Results shall be presented as r.m.s. values of the magnetic flux density expressed in nanotesla (nT) for the two frequency Bands. The values in front of the EUT and the maximum value and its position shall be given both for normal and for standby operation if they differ. If measured values are less than 200 nT in Band I or less than 25.0 nT in Band II the result shall be reported as “<200 nT” and “<25.0 nT” respectively.

B.4.2.5 Overall uncertainty

The test shall be performed in such a way that the total extended uncertainty in the test result will be less than ±(10 % of the reading + 30 nT) for Band I and ±(10 % of the reading + 1.5 nT) for Band II.

Note
The uncertainties given are worst case limits. In many cases it will be possible to obtain better accuracy, especially in Band II.

Back to A.4.2

B.4.3 Acoustic noise

The acoustic noise test shall only be carried out if the Desktop has any internal moving mechanical parts

B.4.3.1 Method

This noise measurement may be done at any test facility accredited according to ISO17025 but the test report must be verified by the TCO Accepted test facility who must signs a verification document for noise, covering all configurations.

Prior to testing, the computer shall have been switched on for 15 minutes.
Switch on the computer and begin recording elapsed time, starting either when the computer is initially switched on, or immediately after completing any log in activity necessary to fully boot the system. Once logged in with the operating system fully loaded and ready, close any open windows so that the standard operational desktop screen or equivalent ready screen is displayed.
Exactly 15 minutes after the initial boot or log in, start to accumulate test noise levels.

The noise measurements shall follow ISO 7779:2010 and shall be declared according to ISO 9296:1988. (However the principle for how the measurement uncertainty is handled shall be the same as for all the other criteria in this TCO Certification. This means that no uncertainty shall be added to the result presented in the report.)

In addition to reporting the measured *A-weighted sound power level* (L_{WA}) in Bels (B) the single measurement values of the 9 measurement positions and the mean value of these A-*weighted sound pressure level* (L_{pA}) in Decibels (dB) have to be included in the test report.

B.4.3.2 Overall uncertainty

The test shall be performed in such a way that the total extended uncertainty in the test result will be less than ± 2.5dB.

Note

The uncertainties given are worst case limits. In many cases it will be possible to obtain better accuracy.

Back to A.4.3

B.6 Environment

B.6.0 General Clarification

B.6.0.1 Signatures

The date of signature shall not be older than 12 months at the time of the application. The templates in the ecological declaration shall be sent either with original signatures or as copies of original documents with original signatures. “Copies” are for example telefaxes or pdf-files of scanned signed documents. TCO Development and/or the responsible test facility may later request the original signed document.

However, copies will not be accepted where the signature has been scanned and pasted into the document.

TCO Development accepts digital signature as an alternative to traditional signature on test reports and declarations submitted as pdf files. To approve a digital signature it is necessary to also submit a digital key to the verifier to facilitate identification.

B.6.1 Product description

The A.6.1 template shall be completed with the requested information about the product.

A type key that includes an Asterisk (*) for unidentified characters, if any, in the model name and panel identification name shall be submitted to the verifier. Only two * may be used in the model type key and each * must include two or more options. For the most up-to-date information about type keys, see the appropriate product Application Process at www.tcodevelopment.com

Back to A.6.1

B.6.2 Manufacturing

B.6.2.1 Environmental management system certification

The certificate shall be issued by a certification body that is accredited by an accreditation body covered by the International Accreditation Forum, www.iaf.nu, Multilateral Arrangement on Environmental Management Systems.

The applicant shall submit an ISO 14001 certificate or EMAS registration for every final assembly plant used to manufacture products certified according to TCO Certified.

For applicants submitting several applications, it is sufficient to attach ISO 14001 certificate(s) or EMAS registration(s) with the first application. The certificate(s) or an appendix to the certificate(s) shall show the scope of the certification.

Manufacturing plants that are not yet certified (and that do not fall into the above mentioned category) can seek a 12 months grace period on the first application to obtain ISO14001 certification or EMAS registration. TCO Development reserves the right to deny grace period if the Applicant is considered a high risk for not meeting the 12 month due date. When seeking grace period an agreement must be completed/signed by the Applicant company.

Back to A.6.2

B.6.3 Climate

B.6.3.1 Energy consumption – Desktop computer

Testing of the product shall be made according to the most recently published version of the Energy Star standard for computers and need only cover the energy consumption requirements of that standard. The product need not be Energy Star certified to be approved for TCO Certified.

Testing is required to be carried out at either test facilities approved by TCO Development or by the U.S. Environmental Protection Agency (EPA). Test facilities shall also be accredited to ISO17025. In both cases the TCO Development approved facility is required to issue a verification report to confirm compliance.
In circumstances there the product is certified to the most recent Energy Star standard the TCO Development approved test facility need only verify that the stated energy consumption levels are within required limits, that the EPA test report is genuine and from a lab that is approved by the EPA and accredited according to ISO17025.

B.6.3.1.1 Special conditions

All exceptions and special requirements, test methods etc. specified by Energy Star are also accepted by TCO Development.

Products that are covered under other Energy Star product specification shall be tested under that specification.

If testing concerns an update of an original certification (additional panel or adapter) that was issued to an older version of an Energy Star standard, then that older version may be used for testing.

B.6.3.2 Energy consumption – external power supply

TCO Development has decided that energy consumption of the external power supply shall follow the EPA demands for compliance with The International Efficiency Protocol requirement for level V, equivalent to the Energy Star version 2.0 for external adapters, also covering battery chargers.

The international efficiency mark consists of a Roman numeral (I – VI) that corresponds to specific minimum Active and No-Load efficiency levels (as well as a power factor requirement for level V) and is printed/applied by the manufacturer on the external power supply marking label.

A test facility approved by TCO Development will require a copy of the display's external power supply marking label where The International Efficiency Protocol requirement for level V symbol is visible as proof of compliance.

Back to A.6.3.1

B.6.4 Hazardous substances

B.6.4.1 Cadmium (Cd), mercury (Hg), lead (Pb) and hexavalent chromium (CrVI)

Exemptions are according to EU Directive 2011/65/EU (RoHS) and the documents supporting the directive.

The maximum concentration values tolerated by weight in homogeneous materials for cadmium, mercury, lead and hexavalent chromium are according to EU Directive 2011/65/EU (RoHS) and the documents supporting the directive.

The limit value for batteries is 0.0005 % for mercury, 0.002 % for cadmium and 0.004 % lead per listed part, according to EU Directive 2006/66/EC.

Back to A.6.4.1

B.6.4.2 Halogenated substances

Mandate 1. The requirement applies to plastic parts in all assemblies and sub-assemblies. LCD panels are included in the requirement.

Exempted are printed wiring board laminates, electronic components and all kinds of cable insulation.

Mandate 2. The requirement applies to the whole of the Desktop computer product, including components, parts and raw materials in all assemblies and sub-assemblies e.g. batteries, paint, surface treatment, plastics and electronic components. Printed Wiring Boards are also included in the requirement.

HBCDD has been identified as a Substance of Very High Concern in accordance with EU REACH criteria. The main application of HBCDD in EEE is as a flame retardant in HIPS plastic being used for closures and structural parts of different types of EEE. TCO Development considers that the use of HBCDD in EEE is not deemed essential as technically suitable alternative substances and materials are available and already used extensively today.

Maximum concentration values tolerated for a restricted substance (including decaBDE) is 0.1 % by weight in homogeneous materials.

Fluoroorganic additives, used to modify the dripping behaviour of plastics in fire conditions or to improve the processing behaviour, are exempted provided that they do not exceed 0.5 % by weight of the material in homogeneous material.

Back to A.6.4.2

B.6.4.3 Non-halogenated substances

Non-halogenated flame retardants can be used in TCO Certified products once they receive an accepted benchmark. TCO Development makes a list of accepted substances available on its website. The Accepted Substances list is dynamic, which allows new substances that have undergone a valid assessment to be added or for accepted substances to come under reassessment in light of new scientific findings. If an accepted substance is reassessed and given a benchmark score lower than 2 TCO Development reserves the right to remove the substance from the accepted substance list. Any substance to be removed will be set a sunset date. The sunset date shall give adequate time (at least one year) for equipment manufacturers to switch to a flame retardant alternative.

When considered necessary, TCO Development reserves the right to request a substance undergo further assessment in order to assess the completeness, quality and validity of a draft benchmark score, such as a GreenScreen Verification assessment.

Full GreenScreen Assessments of substances are made publicly available on databases such as GreenScreen Store http://www.greenscreenchemicals.org/gs-assessments/chemicals or IC2 (Interstate Chemicals Clearinghouse) http://theic2.org/hazard-assessment or Techstreet http://www.techstreet.com/searches/3638231. If no public assessment report is available, then TCO Development may place interested persons in contact with the owner of the report.

Table B.6.4.3.1

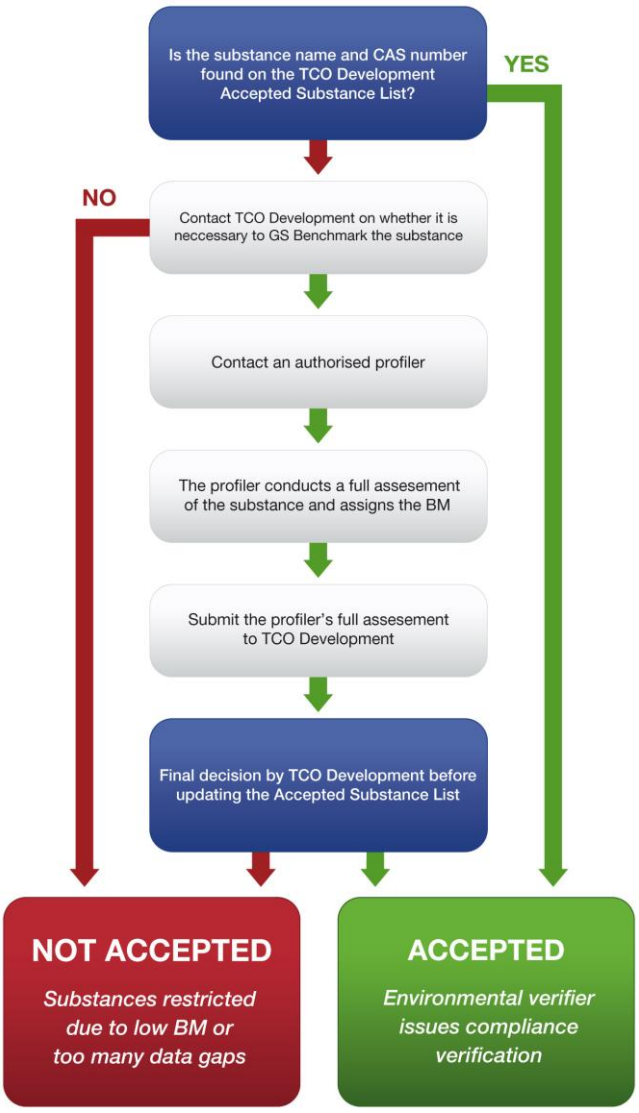
Benchmark key		
Benchmark 4	Few concerns, i.e. safer chemical	Approved for use
Benchmark 3	Slight concern	Approved for use
Benchmark 2	Moderate concern	Approved for use
Benchmark 1	High concern	Not accepted
Unspecified (U)	Insufficient data to assign a benchmark	Not accepted

B.6.4.3.1 Compliance procedures (See also Flow chart B.6.4.3.1)

- **First contact your suppliers such as the plastic and panel manufacturer and ask them to confirm that they only use flame retardants including substances on the accepted substance list.**

- **If all flame retardants only include substances on the Accepted Substances List the procedure is as follows:**
  1. Sign template A.6.4.3 and submit it to the approved environmental verifier. When the verifier considers all environmental documentation is compliant they will issue an Environmental verification to the applicant.

- **If any flame retardant is used that contains a substance that is not on the Accepted** Substances List then it will need to be added before approval can be given by the environmental verifier. For this the procedure is as follows:
  1. Contact TCO Development directly to see if we have any additional information on the substance: Reasons for the substance's absence can be that the substance has received benchmark 1, no assessment has been conducted or it has a benchmark score U (unspecified) due to many data gaps.
  2. If TCO Development requires the substance to be benchmarked, we recommend you contact your supplier and inform them that the substance will need a GreenScreen assessment by a licensed profiler. The list of licensed profilers can be found on the CPA website at http://www.greenscreenchemicals.org/professionals/profilers
  3. A draft report per substance (not flame retardant) is assembled from the available information (literature search, structural similarity comparison, expert judgment) by the profiler.
  4. It is the profiler that sets the benchmark score per relevant substance, which is valid for 3 years. Substances are assessed at 3 year intervals since mandates are revised and more data and new knowledge on the substance may lead to other results.
     Note: All assessments **and** reassessments shall be conducted by licensed profilers.
  5. Full GreenScreen **assessments per substance** shall be submitted to TCO Development for final approval before the Accepted Substances List can be updated.
  6. Once a substance is added to the list and the verifier identifies them, then they will issue the environmental verification to the applicant (see above point 1 under: "*If all flame retardants only include substances on the Accepted Substances List the procedure is as follows"*)



Flow chart B.6.4.3.1. The Compliance procedure

B.6.4.3.2 Grace period

Applicants signing mandate A.6.4.3 have the option to seek a grace period in order to give them time to assess flame retardants used and substitute these if necessary. The request for a grace period shall be sent to TCO Development together with a description on why a grace period is necessary and a timeline for the GreenScreen assessment and/or substitution. On receiving this request, TCO Development will conduct a risk assessment as to whether the applicant can be given a grace period to show compliance. If a grace period is not granted, then the applicant is required to ensure that all used non-halogenated flame retardants only include substances that are on the TCO Accepted Substances list before a certificate can be issued to them. After the grace period, if an approved a grace period exceeds the due date, then the verifier shall contact TCO Development and a course of action will be decided after talking first with the applicant.

Back to A.6.4.3

B.6.4.5 Phthalates

Maximum concentration values tolerated for a restricted substance is 0.1 % by weight of any plasticised homogenous material.

Back to A.6.4.5

B.6.4.6 Hazardous substances in product packaging

Limit values are according to Directive 94/62/EC on packaging and packaging waste.

Back to A.6.4.6

B.6.5 Material Resource Efficiency

B.6.5.1 Lifetime extension

That spare parts shall be available for three years from “the time that production ceases” is only applicable to the production of the specific Desktop computer, certified by the brand owner according to TCO Certified.

Regarding spare parts:

- If a part of a product is broken (e.g. bezel, stand) the end user shall not need to replace the whole product, only the broken part. The broken part shall be possible to replace with an equivalent part (this part does not have to be identical to the broken part).
- When the cost for replacing a broken part (e.g. panel) exceeds the cost of replacing the whole product, then that part need not be considered as a spare part under this mandate.

Back to A.6.5.1

B.6.6 End of life

B.6.6.1 Material coding of plastics

If the amount of flame retardant exceeds 1 % by weight the coding shall be complemented in accordance with ISO 1043-4.

The requirements also apply to plastics in the LCD panel, however labelling of the light guide may instead consist of the application of a label in close proximity, for example PLASTIC LIGHT GUIDE:>*plastic type(s)*< or >PLASTIC LIGHT GUIDE:*plastic type(s)*<. Labelling of Plate diffuser (not thin plastic film diffuser) shall follow the same rules as for the light guide.
The requirement does not cover other thin plastic films in the panel due to difficulties in labelling these.

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B.6.6.2 Take back system

Tick the box of the option chosen.

If the applicant chooses **option 1** (*Product only sold on markets with WEEE legislation or similar*) and signs the declaration, the requirement is fulfilled.

If **option 2 or 3** (*World-wide product take back* or *One additional market lacking WEEE legislation where product take back is offered*) is chosen, the declaration must be signed and the applicant must provide a short description of how the take-back system on that market works. This can also be done by giving a reference (for example a link to a website) to the representative, associated company or affiliate taking care of the take-back system on that market.

In case of option 3 the applicant must also provide the name of the market (country) where a take back system is provided.
TCO Development has no requirement on the take-back system being free of charge.

It is important to point out that any recycling and waste export control legislation in countries where the applicant company operates must always be met.

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TCO DEVELOPMENT

B.7 Socially Responsible Manufacturing

B.7.1 Supply chain responsibility

B.7.1.1 General Clarifications

The mandate is a social performance mandate and criteria are based on the eight ILO (International Labour Organization) core conventions and local legislation. The mandate stipulates the minimum standards for Code of Conduct, Inspection and Corrective Action engagement of the brand owners regarding the situation at their own and/or their supplier's manufacturing facilities of TCO Certified products. .

B.7.1.2 Background information

B.7.1.2.1 SA8000

SA8000 is based on the UN Universal Declaration of Human Rights, Convention on the Rights of the Child and various International Labour Organization (ILO) conventions. SA8000 is a global social accountability standard for decent working conditions, developed and overseen by Social Accountability International (SAI). SAI contracts with a global accreditation agency, Social Accountability Accreditation Services (SAAS) that licences and oversees auditing organisations to award certification to employers that comply with SA8000.
For more information visit: http://www.sa-intl.org/

B.7.1.2.2 Electronic Industry Citizenship Coalition (EICC)

The Electronic Industry Citizenship Coalition (EICC) is a group of companies working together to create a comprehensive set of tools and methods that support credible implementation of the Electronic Industry Code of Conduct. The EICC Code of Conduct is at the core of member requirements and members are required to commit to it, spread that commitment to their supply chains and undertake a range of assessment activities to ensure they are accountable to their commitment to the Code.
The EICC VAP (Validated Audit Process) is a factory audit framework for identifying risks and driving improvements and robust management systems for labour, ethics, health, safety and environmental conditions in the supply chain. It is a third party validated audit service that provides an independent audit of a supplier, potential supplier, and/or a company's own facilities.
For more information visit: http://www.eicc.info/

B.7.1.2.3 Grace Period.

Brand owners signing mandate A.7.1 for the first time have the option to seek a 12 month grace period in order to give them time to improve their supply chain management systems. On receiving this request, TCO Development will conduct a risk assessment as to whether the brand can be given a grace of 12 months to show compliance. If a grace period is not granted, then the brand is required to make all required improvements and actions before a certificate can be issued to them.
After 12 months, if an approved a grace period exceeds the due date, then the verifier shall contact TCO Development and a course of action will be decided after talking first with the brand owner.

B.7.1.3 The verification process

B.7.1.3.1 Proof documentation to be submitted to a Social Reviewer approved by TCO Development

1. Submitting the code of conduct

   The Brand owner shall submit a copy of their code of conduct signed (on the document copy or declaration of identity) by the SMR (or higher ranking member of the company) to an approved Social Reviewer. If the Code of conduct has not changed since last time it was reviewed the brand does not have to send it again. In this instance the SMR shall declare this

   SA8000: If the brand owners head office is certified according to SA8000 then the code of conduct does not have to be reviewed by the Social Reviewer. It is enough to send a copy of the SA8000 certificate to the Environmental Verifier and the Code of conduct with the application to TCO Development.

2. Submitting the proof of the supply chain being informed of the code of conduct.

   The Brand owner shall submit a description on how their first tier manufacturing facilities of TCO Certified products are informed of their code of conduct for review by an approved Social Reviewer.

   SA8000: If the brand owners head office is certified according to SA8000 then a description does not have to be reviewed by an approved Social Reviewer. It is enough to send a copy of the SA8000 certificate to the Environmental Verifier and the description with the application to TCO Development.

3. Submitting the annual factory list

   The Brand owner shall submit an annual list of all first tier manufacturing facilities of TCO Certified products to the Environmental Verifier and TCO Development. The list shall show the factory name, address, date of conducted audit, date of planned audit and type of audit. Each factory shall have an audit date assigned to it. All these audits may be first, second or third party audits (at least one of the audits shall be 3rd party and have been conducted within 12 months from the date the list is submitted). The list shall show that all factories have or will be audited once over a 3 year period.

4. Submitting the annual third party audit report

   The Brand owner must submit one annual third party audit report carried-out at a first tier manufacturing facility of TCO Certified products for review by an approved Social Reviewer. The audit report shall at least cover the criteria in A.7.1 of TCO Certified and be of equal quality as an EICC audit. When possible the audit report shall be from a different first tier manufacturing facility than the previous years unless otherwise specified by TCO Development.

   SA8000: If the first tier manufacturing facility is certified according to SA8000 then the third party audit report does not have to be reviewed by an approved Social Reviewer. It is enough to send a copy of the SA8000 certificate to the Environmental Verifier and a copy of the audit report with the application to TCO Development.

5. Submitting the annual corrective action plan (CAP) if relevant.
   The Brand owner must submit one corrective action plan (CAP) review for any non-conformity found in the submitted audit report to an approved Social Reviewer.
   SA8000: If the first tier manufacturing facility is certified according to SA8000 then then the CAP does not have to be reviewed by an approved Social Reviewer. It is enough to send a copy of the SA8000 certificate to the Environmental Verifier and a copy of the CAP with the application to TCO Development.

B.7.1.3.2 On-site inspection initiated by the Brand owner (Social revision)

In accordance with the compliance options under A.7.1 the Brand owner shall provide a third party conducted social audit and a CAP for any non-conformities carried out at one of their first tier facilities producing TCO Certified products.
The following applies:

- The Brand owner may choose the third party Audit firm.
- Third party auditors used by the Brand owner to carry-out the factory inspection and issue the report shall have documented experience of carrying out social auditing. The auditor should have undergone the SA8000 Advanced Auditor Training or an equivalent training course
- A third party is considered to be a person or body that is recognised as being independent of the parties involved, as concerns the issue in question. Parties involved are normally the Brand owner (first party) and purchaser (second party).

B.7.1.3.3 Review of the proof documents

The approved Social Reviewer will evaluate the documents according to the following principles.

- **Code of conduct:**
  - The code of conduct shall be considered consistent with the ILO:s eight Core Conventions, art 32 in UN:s Convention on the Rights of the Child, the health and safety legislation in force in the country of manufacture, and the labor law, including rules on minimum wage and the social security protection in the manufacturing country
  - The contents of the code of conduct shall have been adopted by the Board and addressed by management.
  - The code of conduct shall relate to the manufacturing of the specific product being certified.
- **Supply chain being informed of the code of conduct:**
  - Examples may be that the Brand Owner has translated the Code of Conduct into local languages. This shows that the company has made efforts so that management and employees are able to be informed about the code's content in their own language.
  - Or the company has conducted training on the Code for employees and/or management at production facilities.
  - Another common way to inform production facilities can be to have them fill out a questionnaire (self-assessment) on compliance with the code.

- **Audit report reviews:** Central to the compliance options is the review of the factory audit report conducted by a third party Social Reviewer approved by TCO Development. Audit reports sent for review shall not be older than 12 months. It shall be authentic, conducted by an auditor with the correct competence and cover the relevant manufacturing site.
- **Corrective Action Plan (CAP)**: If there were findings during the factory inspection then a CAP (remedial plan plus timelines and evidences) for the findings shall be submitted for review together with the audit report. This CAP will be evaluated for effectiveness by the Social Reviewer. A judgement on the remedial effectiveness and a summary will be given in the Verification Report issued by the Social Reviewer.

- **The approved Social Reviewer:** All supporting documentation shall be reviewed by a third party approved by TCO Development. This reviewer shall not be the same person that conducted the factory audit. The reviewer has the authority to review and verify the following types of documents:
  - Code of conducts
  - Communication of the code of conduct
  - Audit reports,
  - CAPs,
  - SA8000 certificates/audits
  - Supporting documentation

After the review the Social Reviewer issues the Audit Report Verification document to the Brand owner or the applicant. It is the final responsibility of the Brand owner to submit this document to TCO Development to show that they are aware of the situation at the factory and accept the report.
A verification report issued by the approved Social Reviewer is valid for 12 months from the date of the Brand owner's first issued TCO Certified certificate covering mandate A.7.1. The verification must be updated annually. The list of approved Social Reviewers is found at: www.tcodevelopment.com

B.7.1.3.4 On-site inspection initiated by TCO Development (Spot-checks)

TCO Development reserves the right to require full audit reports and conduct or commission on-site inspections at first tier manufacturing facilities to verify that the Brand owner is fulfilling the obligations according to this mandate. The planning of social audits will be done in cooperation with the Senior Management Representative appointed by the Brand owner. Audits will be implemented by TCO Developments partner organisation for the actual geographic region. Social audits initiated by TCO Development will be realized on a judgement sample basis, in each case decided by and financed by TCO Development. Results from the audits will be shared with audited factory (both management and worker representatives) and all the brand owners listed as using the audited factory in order to create a combined effort toward implementing the CAP. For TCO Development, the spot-checks and all other submitted reports contain valuable information on social performance, making it possible to translate findings into metrics and then measure improvement through code of conduct and audit methodology.

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B.7.2 Senior Management Representative

B.7.2.1 General Clarifications

The mandate underlines the importance for the Brand owner to appoint a senior management representative who, irrespective of other responsibilities, has the authority to ensure that the requirements of this mandate are met. This aims to create an open and transparent dialogue between TCO Development and top management at the brand owner company.

B.7.2.2 SMR review

The intention of the review of the SMR is to ensure that the SMR has the necessary authority and is working in a structured way in implementing the Brand owner's code of conduct. The SMR may bring assistants to the review meeting if needed.
The following questions will be asked of the SMR:

1. The SMR will be asked questions on how the communication of the Brand owner's code of conduct to first tier factories has been done. (See point 1 of the self-assessment questionnaire)
2. The SMR will be asked questions about the Brand owner's audit schedule and about some of the audits that have been done. (These reports may be first, second or third party audits).
3. The SMR will be asked to show examples of progress for some corrective action plans.
4. The SMR will be asked to fill in the self-assessment questionnaire on proactive work (point 2-19) by TCO Development (B.7.2.2.1) prior to the review and explain in more detail the Brand owner's proactive work to implement their code of conduct during the review. The SMR might be asked to show supporting documentation for this. The self-assessment questionnaire does not have to be reviewed by a verifier approved by TCO Development. It is sent directly to TCO Development prior to the SMR review.

The Questionnaire and Guidelines for the assessment are public and can be downloaded at: www.tcodevelopment.com

As long as the SMR is able to show the relevant documents and explain the Brand owner's structured work to implement their code of conduct the review is accepted. If the SMR is not able to get hold of necessary documents or if he/she cannot explain about the Brand owner's structured work to implement their code of conduct the review is not accepted.

The review may be done through an online meeting. However, it is necessary that documents can be shared (during or prior to the meeting) and that the communication quality is adequate for full understanding.

If it is not possible to set up an online meeting that fulfils the requirements above or if the review does not give an acceptable result then TCO Development has the right to require the SMR to be reviewed by a third party auditor paid by the brand owner. The report from this review is then sent to TCO Development.

TCO Development also has the right to require a face to face review of the SMR. For this type of review, TCO Development will cover their own costs.

B.7.2.2.1 Self-assessment questionnaire on proactive work

The self-assessment questionnaire is provided by TCO Development and is a set of questions covering such areas as the implementation of the Brand owner's code of conduct, auditing and follow-up of social criteria, trade union rights and representation, activities to avoid discrimination and create an open dialogue with suppliers.

The Brand owner SMR is responsible for answering all questions and providing documented proof of how it supports its suppliers in these areas. Each answer is colour graded full- (Green), partial- (Yellow) or non- (Red) compliance level.

In order to highlight the need for progressive improvement and level the commitment between different brands, the questionnaire is required to be submitted annually during the SMR review. However, the self-assessment questionnaire does not have to be reviewed by a verifier approved by TCO Development. It is sent directly to TCO Development prior to the SMR review.

There is currently no minimum level required for the proactive work reported in the questionnaire (point 2-19) in this generation of TCO Certified. The data collected in the questionnaire on proactive work will be used to risk assess Brand owners for the spot-check program. In this program TCO Development make annual third party factory audits according to the code of conduct on a number of Brand owners first tier factories. The questionnaire is also intended to measure the progress in the industry and to be used as a basis for future criteria development in this area.

The Questionnaire and Guidelines for the assessment are public and can be downloaded at: www.tcodevelopment.com

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B.7.3 Conflict minerals

B.7.3.1 General Clarifications

The mandate mainly focuses on the 3T+G minerals which are being mined within the Democratic Republic of Congo (DRC) region and used in a wide range of computer products. Once refined the origins of minerals are hard to trace, therefore we are recommending the importance of participation with legitimate in-region initiatives that directly benefit people in the conflict-affected regions. However, since the number of participants for in-region initiatives are low at this stage we also accept involvement in smelter/refinery certification programs since they complement in-region initiatives. Also we approve brands that can satisfactorily provide proof that they have adopted the *OECD Due diligence guidance,* since it provides a framework for brands to ensure that they respect human rights and do not directly or indirectly contribute to conflict.

B.7.3.2 Background information about the initiatives

TCO Development is demanding brands address the conflict mineral concerns of the private and public sector while delivering solutions that benefit those involved in the responsible minerals trade in the DRC. TCO Development considers participation in the following initiatives facilitates that goal. It is TCO Developments opinion that the OECD Due Diligence Guidance for Responsible Supply Cain of Conflict-Affected or High-risk Areas is the most ambitious approach in the list.

- *The OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas* ("the Guidance"). Brands require suppliers to disclose their sourcing origins of conflict minerals by using a questionnaire template such as the EICC 'Conflict Minerals Reporting Template' or similar in order to prevent the potential use of conflict minerals.
- *iTSCi* - ITRI represent tin producers and smelters. This program is a supply chain initiative to verify and trace minerals from the mine to smelter (traceability tagging). Although full membership is focused on upstream companies (Mining, Smelters etc) an Associate membership for downstream companies exists (manufacturers etc). Associate members contribute to the financing of the iTSCi program and so keep informed of initiative activities, specific mining sites whilst they support development in Africa.

  ***For more information*:**

  https://www.itri.co.uk/index.php?option=com_zoo&view=item&Itemid=191
- *Conflict-free Tin Initiative* (CFTI); sources conflict-free tin from the South Kivu province of DRC that implements the ITRI Tin Supply Chain Initiative (iTSCi) the due diligence and traceability system
- *The Public-Private Alliance for Responsible Minerals Trade* (PPA) is a multi-sector and multi-stakeholder initiative that provides funding and support to systems that trace and certify mineral supply chains in the DRC and Great Lakes Region. http://www.resolv.org/site-ppa/

- Other relevant in-region initiative. Initiatives not given in the list but prove active commitment to an initiative that aims at increasing legitimately sourced minerals.

  Examples of other relevant initiatives that are approved:

  - *Solutions for Hope* (SfH); sources conflict-free tantalum from the Katanga province of DRC (incorporates the iTSCi process and CFS program).
  - *The Certified Trading Chains* initiative (CTC) is a program supported by the German government and certifies mines to defined performance standards

- Member of the EICC & GeSi *Conflict-Free Sourcing Initiative* (CFSI). Members contribute to a number of tools and resources including the Conflict Minerals Reporting Template; supporting in-region sourcing schemes and the Conflict Free Smelter Program (identification of Smelters and Refiners that source conflict-free minerals).

B.7.3.3 The verification process

At least one of the options in the mandate box shall be marked. Every initiative the Brand is a participant in shall be provided. The following shall occur before the verifier may issue a verification of compliance.

- The template shall be completed by the responsible person at the brand owner company.
- The brand shall complete the TCO Certified Conflict Mineral Questionnaire and submit it and any required supporting documents for review. The verifier then assesses compliance and issues the verification report.

Supporting documents

- If the brand has a management system covering conflict minerals within its supply chain which it states are based on the OECD Due Diligence guidelines, then a supporting document that outlines those due diligence measures shall be submitted. Example of proof are:
  - Due Diligence Roadmap, Sustainability report or Conflict Mineral Report asserting the OECD five step framework.
  - Link to where information/findings are posted on the brand's website.
- The brand shall provide a copy of its conflict mineral policy and state where the information is made public.
- If the brand is part of an in-region initiative or the EICC CFSI, then supporting documents or links to relevant websites shall be provided to the approved verifier in order for them to verify participation.
- If the brand marks the option 'Other relevant initiative', then the name of the initiative shall be entered into the template and information on the initiative (or website) shall be submitted to the verifier and they will contact TCO Development in order to make a joint assessment before it can be accepted as an option. Although unlikely, any additional review fee entailed for an extra assessment will be charged to the applicant, after receiving the applicant's consent.
- When the application is satisfactory, the verifier notes on the verification report the fulfilled options and the type of supporting documentation.

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