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Introduction

TCO (The Swedish Confederation of Professional Employees) has, since the end of the 1980s, been involved in influencing the development of IT equipment, particularly Visual Display Units (VDUs), in a more user-friendly direction. Since 1998 this work has been carried out by TCO Development, a wholly-owned TCO subsidiary company.

Co-operative partners in the scheme were The Swedish Society for Nature Conservation, The Swedish National Energy Administration and SEMKO AB.

The requirement areas have been developed from the Green Office, a Swedish project that was put together and used with great success during negotiations in Sweden in the late 1990s. The requirements and structure also bear unmistakable signs of the successful TCO environmental labelling schemes for computer displays, keyboards and system units, TCO'99.

The basic requirements and criteria come from the 1.2 million members within the TCO-associated trade unions, who work with printers, faxes and copiers. This means that the main emphasis is on functionality, ergonomically correct design and ease of use. In addition, there are requirements concerning emissions into the working environment, energy efficiency, and ecological requirements for material and recycling. Demands are set on the applicant companies' environmental work and finally on the manufacturing processes that are used during production.

Experts and researchers have also provided advice to ensure that the requirements shall conform to the present state of the art, although this has not been the only factor taken into account in our choices and formulation of the requirements.

The requirements are in some cases obligatory and in others recommended. Among the recommended requirements is however three which although voluntary are very desirable as far as TCO is concerned. They are: 2.7 Double-sided printing, 3.6 Energy saving and 6.4 Flame retardants in printed wiring boards.

The TCO certification system is a challenge for those manufacturers who have decided to adapt information technology to meet the needs of professionals, the work environment and nature, while at the same time accepting high quality requirements as a possibility rather than a burden.

Changes in version 2.0

In TCO'99 version 2.0, the ecological requirements are adapted to the EU directive Restriction of certain Hazardous Substances (RoHS).

Some minor changes of requirements due to interpretations that have previously been communicated are also included.

TCO Development welcomes comments on these requirements and suggestions for future updates.

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TCO'99 - Printers. Mandatory and recommended requirements for office printers concerning:

- **Product Safety**
- **Ergonomics, Handling and Physical design**
- **Emissions in the Working Environment**
- **The applicant company's environmental management strategy**
- **Manufacturing Processes**
- **Ecology**
- **Operator's Manual**

Introduction

The TCO'99 - Printers labelling scheme also covers Fax machines and Copiers for office use. Separate reports for these items are already available. The characteristics included in the TCO'99 - Printers scheme originate from TCO'99, ISO, IEC and EN-standards and also from such national specifications as the Swedish MPR 1990:8 (MPRII) and TCO Screen Facts 1991.

Main References

EN 60 950 (IEC 60 950), Safety of information technology equipment, including electrical business equipment.

ISO 7779, Acoustics - Measurement of airborne noise emitted by computer and business equipment.

ISO 9296, Acoustic - Declared noise emission values of computer and business equipment.

MPR 1990:8, section 2.05, Test methods for Visual Display Units.

Nordic Guidelines for Computer Accessibility, Second Edition, 1998. Nordic Cooperation on Disability.

Swiss Energy 2000, Labelling criteria for Printers, April 6, 1999.

TCO, Screen Facts, 1991.

TCO'99 Certification, Report No. 1. DISPLAY (CRT), First Edition, 1998.

TCO'99 Certification, Report No. 2. DISPLAY (flat), First Edition, 1998.

TCO'99 Certification, Report No. 3. SYSTEM UNITS, First Edition, 1998.

TCO'99 Certification, Report No. 5. ECOLOGY for Displays, System Units and Keyboards, First Edition, 1998.

US EPA Energy Star Program for Printers/Faxes Machines. Memorandum of Understanding (MOU), October 2, 1995.

Mandatory and recommended requirements for office printers

		<u>Mandatory requirement</u>	<u>Recommended requirement</u>
1 Product Safety			
1.1	Product safety	X	-
1.2	Radio interference	-	R
2 Ergonomics, Handling and Physical design			
2.1	Controls - finding, reaching, identifying and using	XM	-
2.2	The perception of alarms, warnings, status signals and errors messages	XM	-
2.3	Printer location	XM	-
2.4	Access inside the printer e.g. to clear a paper jam	XM	-
2.5	Self-test function for fault finding	XM	-
2.6	Print on recycled paper	XM	-
2.7	Double-sided printing	-	R
3 Emissions in the Work-Environment			
3.1	Emission of dust during normal operation	X	R
3.2	Emission of ozone during normal operation	X	-
3.3.1	Acoustic noise from a laser printer	X	-
3.3.2	Acoustic noise from an ink-jet printer	X	-
3.3.3	Acoustic noise from a matrix printer	X	-
3.4	Alternating electric fields	X	-
3.5	Alternating magnetic fields	X	-
3.6	Energy saving	XM	R
4 Applicant Company's Environmental Management Strategy			
4.1	Environmental management system certification	XM	-
5 Deleted			
6 Environmental Hazards			
6.1	Mercury, cadmium and lead in batteries	XM	-
6.2	Mercury and cadmium in electronic components	XM	-
6.3	Flame retardants in plastic components	XM	-
6.4	Flame retardants in printed wiring boards	-	R
7 Preparation for Recycling			
7.1	PVC and Labelling of plastics	XM	-
7.2	Metallized plastic components and housings	XM	-
8 TCO Document			
8.1	Quality document accompanying the product	XM	-

Definitions

X or XM are characteristics required for certification.

X = characteristics that shall be verified by accredited or other laboratories accepted by TCO.

XM = characteristics which can be verified by accredited or other laboratories accepted by TCO or by the suppliers' own test reports or declarations.

R = characteristics that are not required for certification at present, or characteristics that might be required in the future.

Printers

1 Product Safety

1.1 Product safety

Reason: 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 printers.

References: EN 60 950 (IEC 60 950). Safety of information technology equipment including business equipment.

Mandate: The printer shall be certified in accordance with EN 60 950.

Recommendation: -

The following information shall be submitted:

A copy of the EN 60 950 certificate issued by a recognised testing laboratory within the CB scheme showing the date, name and address of the laboratory, brand and model name of the tested unit.

1.2 Radio interference

Reason: The requirement entails that the equipment will not mutually interfere with radio signals from other apparatus.

Applicability: All printers.

References: EN 55 022, Limit Class B

Mandate: -

Recommendation: The printer should meet the European requirements for radio interference in accordance with standard EN 55 022, Limit Class B.

The following information shall be submitted:

A copy of the EN 55 022, Limit Class B, certificate issued by a recognised/experienced testing laboratory showing the date, name and address of the laboratory, brand and model name of the tested unit.

2 Ergonomics, Handling and Physical design

2.1 Controls - finding, reaching, identifying and using

- Reason:** The massive impact of IT on working life puts a focus on usability aspects of office equipment. Printers must therefore include such characteristics as accessibility and usability for the intended user population that also includes people with permanent or temporary disability.
- Applicability:** All printers.
- References:** Nordic Guidelines for Computer Accessibility, Second Edition, 1998.. Nordic Cooperation on Disability. Editor: Clas Thorén.
ISO 9241:1998 and ISO/WD 11064.
PrEN 1005-1 and 2.
Human Factors in Product Design, Elsevier 1991.
The Swedish Agency for Administrative Development (Statskontoret), K: 146, Kravspecifikation 1998. Upphandling av persondatorer mm.
- Mandate:**
1. The surfaces of the controls shall not contain chromium, nickel or other material which may cause an allergic reaction.
 2. Controls shall be placed so that they can easily be reached by, for example, a short person or a person sitting in a wheelchair.
 3. The size, shape and surface of controls shall be designed so that they are easily grasped when they are used as intended.
 4. Controls operated by-keys shall have an operating force and a travel characteristic. The operating force shall not exceed 2.0 Newton. Touch-sensitive keys are not recommended.
 5. Controls shall be located (grouped), designed and marked in a way that is logical for their intended use.
 6. Legends on operating controls shall be easy detectable by use of contrast and symbols. It shall be possible to arrange controls with tactile symbols (such as Braille for visually disabled persons).
 7. Controls shall be marked so that their settings can be easily identified by touch.
 8. Status information on displays should enable the user to perform perceptual tasks effectively, efficiently and with satisfaction.
 9. Mechanism employing latches for opening and

closing shall not require the simultaneous use of two hands.
10. Handles or cut-outs for opening and closing shall not have sharp edges or pose a risk of compressing the fingers.

Recommendation: -

The following information shall be submitted:

A written document declaring that the applicant company or a partner has recourse to the competence and organisation necessary to ensure a high level of service for disabled people. The document shall also declare that the controls have the required characteristics. The document shall be signed by the applicant company's production manager.

2.2 The perception of alarms, warnings, status signals and error messages

Reason: The massive impact of IT on working life puts a focus on usability aspects of office equipment. Printers must therefore include such characteristics as accessibility and usability for the intended user population that also includes people with permanent or temporary disability.

Applicability: All printers.

References: Nordic. Guidelines for Computer Accessibility, Second Edition, 1998. Nordic Cooperation on Disability. Editor: Clas Thorén.
ISO 9241:1998 and ISO/WD 11064.
Human Factors in Product Design, Elsevier 1991.
The Swedish Agency for Administrative Development (Statskontoret), K: 146, Kravspecifikation 1998. Upphandling av persondatorer mm.

Mandate:

1. Signals from the basic system (apart from the application program), such as alarms, warnings, status lamps and error messages, shall have the following characteristics:
 - Alternative forms - auditory, visual or tactile - shall be available, allowing both visually and hearing impaired persons to adapt the signalling to their perceptive characteristics.
 - The volume, and if possible also the pitch and frequency, of auditory output shall be adjustable.
 - Visual signals shall be placed where they are easily perceived.
2. Warnings and similar alert messages must remain stable for a sufficiently long time to be noticed by the user. One way of avoiding problems is to let the message remain until it has been acknowledged and dismissed by the user.
3. It shall be possible to show alarms from the printer on the display of the workstation.

Recommendation: -

The following information shall be submitted:

A written document declaring that the applicant company or a partner has recourse to the competence and organisation necessary to ensure a high level of service for disabled people. The document shall also declare that the alarms, warnings, status signals and error messages have the required perception characteristics. The document shall be signed by the applicant company's production manager.

2.3 Printer location

Reason: To conserve space, the printer must be capable of being positioned up against a wall without hindrance to its operation or maintenance.

Applicability: All printers.

References: The Swedish Agency for Administrative Development (Statskontoret), K:138 Kravspecifikation 1996. Upphandling av persondatorer mm.

Mandate: The printer shall be capable of operating while placed against a wall, without the need to move it for normal use and maintenance.

Recommendation: -

The following information shall be submitted:

A written document declaring that the printer can be placed against a wall without needing to be moved for normal use and maintenance. The document shall be signed by the applicant company's production manager.

2.4 Access inside the printer, e.g. to clear a paper jam

Reason: If there are simple and obvious steps that can be taken in the case of a paper jam, this helps to reduce user stress. It should, naturally, be possible to act in the complete assurance that there is no risk of personal injury, or of erasing information that may be stored electronically in the printer memory.

Applicability: All printers.

References: The Swedish Agency for Administrative Development (Statskontoret), K:138 Kravspecifikation 1996. Upphandling av persondatorer mm.

Mandate: It shall be easy and safe to gain legitimate access into the printer, without fingers or hands being squeezed or cut, and in the case of a paper jam, without erasing information that may be stored electronically in the printer memory.

Recommendation: -

The following information shall be submitted:

A written document declaring that there is no risk of personal injury, or of erasing information that may be stored electronically in the printer memory, when there is a legitimate need for access inside the printer, such as in the case of a paper jam. The document shall be signed by the applicant company's production manager.

2.5 Self-test function for fault finding

Reason: If the printer stops working, there shall be a system to help the user to find the problem and to indicate the appropriate measures to correct it.

Applicability: All printers.

References: The Swedish Agency for Administrative Development (Statskontoret), K:138 Kravspecifikation 1996. Upphandling av persondatorer mm.

Mandate: The printer shall have a self-test function for fault finding, i.e. for assisting the user to solve the problem.

Recommendation: -

The following information shall be submitted:

A written document declaring that there is a self-test function for fault finding. The document shall be signed by the applicant company's production manager.

2.6 Printing on recycled paper

Reason: A printer that can print on recycled paper means that the user is able to choose a paper quality that has a reduced impact on the environment.

Applicability: All printers.

References: US EPA Energy Star Program for Copiers.

Mandate: It must be possible to print on paper with a content of up to 20 % recycled fibre.

Recommendation: -

The following information shall be submitted:

A written document declaring that the printer can print on 20 % recycled paper without any loss of print quality. The document shall be signed by the applicant company's production manager.

2.7 Double-sided printing

Reason: Printing on both sides of the paper reduces costs and paper consumption.

Applicability: All printers.

References: US EPA Energy Star Program for Copiers.

Mandate: -

Recommendation: The printer should be able to automatically place images on both sides of a sheet of paper as it passes through the printer.

The following information shall be submitted:

A written document declaring that the printer can print on both sides of the paper. The document shall be signed by the applicant company's production manager.

3 Emissions in the Working Environment

3.1 Emission of dust during normal operation

- Reason:** Dust affects the respiratory organs.
- Applicability:** All printers.
- References:** RAL-UZ 85 or ASTM D 4532-92.
- Mandate:** During normal operation, the emission of dust shall not exceed an indoor-air dust concentration of 0.150 mg/m³.
- Recommendation:** During normal operation, the emission of dust should not exceed an indoor-air dust concentration of 0.0075 mg/m³.

The following information shall be submitted:

A copy of a test report from an accredited test laboratory, showing date of test, test location with address and responsible person, brand and model name of the tested unit.

3.2 Emission of ozone during normal operation

- Reason:** Ozone affects the respiratory organs.
- Applicability:** All printers.
- References:** RAL-UZ 85 or ASTM D 5156-91.
- Mandate:** During normal operation, the emission of ozone shall not exceed an indoor-air ozone concentration of 0.020 mg/m³.
- Recommendation:** -

The following information shall be submitted:

A copy of a test report from an accredited test laboratory, showing date of test, test location with address and responsible person, brand and model name of the tested unit.

3.3.1 Acoustic noise from a laser printer

- Reason:** Noise is undesired sound. People are sensitive to sound and become stressed by the wrong kind of sound. Undesired sound can cause significant stress, both for those working with the equipment and passive listeners.
- Applicability:** Laser printers.

References: Measured in accordance with ISO 7779 (EN 27779) and declared in accordance with IS09296.

Mandate: When printing in black and white the laser printer shall meet the following requirements for declared A-weighted sound power levels:
 $L_{WAd} = 0.5862 * S + 54.414 \text{ dB}$
(S= Manufacturer's nominal printing speed (page/mkinute))

Recommendation: -

The following information shall be submitted:

A copy of a test report from an accredited test laboratory, showing date of test, test location with address and responsible person, brand and model name of the tested unit.

3.3.2 Acoustic noise from an ink-jet printer

Reason: Noise is undesired sound. People are sensitive to sound and become stressed by the wrong kind of sound. Undesired sound can cause significant stress, both for those working with the equipment and passive listeners.

Applicability: Ink-jet printers.

References: Measured in accordance with ISO 7779 (EN 27779) and declared in accordance with IS09296.

Mandate: The sound pressure levels for the ink-jet printer shall be maximum 50 dB (A) in operation and 40 dB (A) in standby and low power mode, respectively.

Recommendation: -

The following information shall be submitted:

A copy of a test report from an accredited test laboratory, showing date of test, test location with address and responsible person, brand and model name of the tested unit.

3.3.3 Acoustic noise from a matrix printer

Reason: Noise is undesired sound. People are sensitive to sound and become stressed by the wrong kind of sound. Undesired sound can cause significant stress, both for those working with the equipment and passive listeners.

Applicability: Matrix printers.

References: Measured in accordance with ISO 7779 (EN 27779) and declared in accordance with ISO9296.

Mandate: The matrix printer shall meet the following requirements for sound pressure levels:

Dots per second	Operational Mode, dB (A)	Standby and Low-Power Mode, dB (A)
1 -299	max. 52	max. 40
300-499	max. 55	max. 40
over 499	max. 58	max. 40

Recommendation: -

The following information shall be submitted:

A copy of a test report from an accredited test laboratory, showing date of test, test location with address and responsible person, brand and model name of the tested unit.

3.4 Alternating electric fields

Reason: Alternating electric fields arise between objects with different electrical potentials. A printer contains several sources of alternating electric fields. The strength of the fields depends on both distance and on the actual electrical potential. Some printer users are concerned about the possible danger to health of alternating electric fields in the vicinity of printers. Quite a large number of users also report various forms of skin ailment that cannot be entirely ascribed to the influence of working environment factors or to medical reasons.
The mandatory requirement is based on the ambition of reducing the alternating electric fields to as low a level as it is technically possible to achieve, so as not to burden the working environment with unnecessary factors.
The mandatory requirement shall however not be taken as representing hygienic limit values.

Applicability: All printers.

References: See test method section.

Mandate: Band I: 5 Hz to 2 kHz, ≤ 10 V/m, measured at 50 cm in front of the printer.
Band II: 2 kHz to 400 kHz, ≤ 1.0 W/m, measured at 50 cm around the printer.

Recommendation: -

The following information shall be submitted:

A copy of a test report from a test laboratory accepted by TCO Development, showing date of test, test location with address and responsible person, brand and model name of the tested unit.

3.5 Alternating magnetic fields

Reason: Printers, like other electrical apparatus, are surrounded by magnetic fields. Various parts in the printer, such as power supply unit, transformers, motors and other circuits generate these magnetic fields.
Some printer users are concerned about the possible danger to health of being in the close vicinity of alternating magnetic fields. Alternating magnetic fields can also cause problems for CRT displays.
The mandatory requirement is based on the ambition of reducing the alternating magnetic fields to as low a level as it is technically possible to achieve, so as not to burden the working environment with unnecessary factors. The mandatory requirement shall however not be taken as representing hygienic limit values.

Applicability: All printers.

References: See test method section.

Mandate: Band I: 5 Hz to 2 kHz, ≤ 200 nT, measured at 50 cm around the printer.
Band II: 2 kHz to 400 kHz, ≤ 25 nT, measured at 50 cm around the printer.

Recommendation: -

The following information shall be submitted:

A copy of a test report from a test laboratory accepted by TCO Development, showing date of test, test location with address and responsible person, brand and model name of the tested unit.

3.6 Energy saving

Reason: The electrical energy consumed by a printer can be considered as being completely converted into heat energy, that warms up the room in which it is placed. Apart from the conversion in this way of electric energy to heat energy, high power consumption wastes electricity.
If the additional heat is more than can be handled by the capacity of the normal room ventilation, an undesired increase of room temperature may result. Also, taking into account the general desire to reduce electrical energy consumption, it is important for all electrical equipment, the cooling system included, to consume as little energy as possible.

Applicability: All printers.

References: US EPA Energy Star program, Memorandum of Understanding (MOU), October, 1995 and Swiss Energy 2000 label, (1999).

Mandate: The printer shall meet the following requirements for electricity consumption in its low-power mode:

Pages per minute	Power in Low-Power mode, [watt]	Pre-set time for Low-Power mode, [min]
1-7	max. 10	max. 15
over 7	max. 25	max. 30
Colour printer	max. 25	max. 30

The re-start time from Low-Power mode to operational mode shall be a maximum of 20 sec.

The printer shall be delivered with the low-power mode activated.

Recommendation: The printer should meet the following requirements for electricity consumption in its standby and off mode:

Pages per minute	Power in Standby mode, [watt]	Power in Off mode, [watt]
1-7	max. 6	max. 3.0
over 7	max. 16	max. 3.0
Colour printer	max. 16	max. 3.0

The following information shall be submitted:

A copy of a test report, showing date of test, test location with address and responsible person, brand and model name of the tested unit

4 The applicant company's environmental management strategy

4.1 Removed

4.2 Environmental management system certification

Reason: The possession of ISO 14001 certification, or the fact of being EMAS registered do not necessarily mean that the company's products are better adapted to environmental criteria, although these qualifications do indicate that the company acknowledges the importance of environmental issues.

Applicability: All printers.

Mandate: In order to be able to apply for TCO'99 - Printers labelling approval the manufacturer, or at least the business area or similar operation manufacturing the product, shall be certified in accordance with ISO 14001 or registered with EMAS. If the product is manufactured by a third party, it is this firm that shall have the qualification.

Recommendation: -

The following information shall be available:

A copy of the ISO 14001 or EMAS certificate. If the certificate is not yet available, a written document giving the name of the manufacturing plant and the time-schedule for the certification process, along with a written environmental policy, signed by the applicant company's environmental manager.

4.3 Removed

5 Removed

6 Environmental Hazards

6.1 Mercury, cadmium and lead in batteries

Reason: All kinds of battery (rechargeable, button cell and torch cell) must be free from mercury, cadmium and lead. If there is a battery that contains heavy metals in the equipment, it should be easily removable and information concerning its disposal must be included.

Applicability: All printers.

Mandate: Batteries shall not contain any mercury, cadmium or lead (i.e. no active additives of these substances).

Recommendation: -

The following information shall be submitted:

A written document declaring that the batteries do not contain any mercury, cadmium or lead. The document shall be signed by the applicant company's environmental manager.

6.2 Mercury, cadmium, lead and hexavalent chromium

Reason: The effects of mercury and cadmium on human health and the natural environment have been very thoroughly documented since the mid-1950s. Lead is a well known hazardous element. Lead has a very well documented negative health effect and is subject to restrictions in many countries and for different kind of uses. Hexavalent chromium causes severe allergic reactions and is also considered genotoxic, potentially damaging the DNA. In addition, hexavalent chromium compounds are assumed to be toxic for the environment. In an EU Directive, mercury, cadmium, lead, and hexavalent chromium shall be phased out in electrical and electronic equipment, no later than by July 1st, 2006.

Applicability: All printers.

Mandate: The product and peripheral equipment shall not contain mercury, cadmium, lead, or hexavalent chromium. The requirement applies to components, parts, and raw materials in all assemblies and sub-assemblies of the product.

The limit values for mercury, lead, and hexavalent chromium is 0.1 % by weight and for cadmium 0.01 % by weight in homogeneous materials.

Exemptions: Exemptions, e.g. mercury lamps, are in accordance with EU Directive 2002/95/EC (RoHS). If TCO Development decides to deviate from the exemptions in EU Directive 2002/95/EC this will be informed in an amendment on the website www.tcodevelopment.com.

Recommendation: -

The following information shall be submitted:

A written document declaring that the electronic components do not contain any mercury, cadmium, lead, and hexavalent chromium and also describing how the work to ascertain that none of the electronic components contain mercury or cadmium has been carried out. The document shall be signed by the applicant company's environmental manager.

6.3 Restricted flame retardants

Reason: Plastic materials based on or containing halogens are environmentally problematic, causing, amongst other things, the formation of environmentally hazardous substances when incinerated. It is extremely important that the manufacturer has complete control over the environmentally hazardous substances which are used in the product. It is preferable if flame retarding requirements can be met without adding extra chemicals.

Applicability: All printers.

Mandate: Plastic components weighing more than 25 grams shall not contain flame retardants that contain organically bound chloride or bromide.

The product and peripheral equipment shall not contain PBB and PBDE.

The limit values for flame retardants is 0.1 % by weight in homogeneous materials.

Exemption: Special plastic parts located close to the heating and fusing facilities. These parts must not contain any PBB, PBDE or chlorinated paraffins.

Recommendation: -

The following information shall be submitted:

A written document declaring that no flame retardants containing organically bound chloride or bromide are used and that the product does not contain PBB and PBDE. A written list of plastic components that weigh more than 25 grams. The list shall include for each component its name, type of plastic used, flame retardant type, plastic brand name and plastic model name. The list shall be signed by the applicant company's environmental manager.

6.4 Flame retardants in printed wiring boards

Reason: Plastic materials based on or containing halogens are environmentally problematic, causing, amongst other things, the formation of environmentally hazardous substances when incinerated. It is extremely important that the manufacturer has complete control over the environmentally hazardous substances which are used in the product. It is preferable if flame retarding requirements can be met without adding extra chemicals.

Applicability: All printers.

Mandate: -

Recommendation: Printed wiring boards shall not contain flame retardants that contain organically bound chloride or bromide.

The following information shall be submitted:

A written document declaring that no flame retardants containing organically bound chloride or bromide are used. A written list of suppliers of printed wiring boards used. The list shall include for each board its name, flame retardant type, board brand name and board model name. The list shall be signed by the applicant company's environmental manager.

7 Preparation for Recycling

7.1 PVC and Labelling of plastics

Reason: Separation of different plastics is a prerequisite for their recycling. Separation is partly facilitated by a label which consists of three arrows and a code.

Applicability: All printers.

Mandate: Plastic components of any size containing chlorinated or brominated polymers, e.g. PVC, are not accepted.
Plastic components that weigh more than 25 grams shall be labelled in accordance with ISO 11469, ISO 1043-1, ISO 1043-2, ISO 1043-3 and ISO 1043-4.

Recommendation: -

The following information shall be submitted:

A written document declaring that no plastic components contain chlorinated or brominated polymers, e.g. PVC and that all plastic components weighing more than 25 grams are labelled in accordance with ISO 11469, ISO 1043-1, ISO 1043-2, ISO 1043-3 and ISO 1043-4. A written list of plastic components that weigh more than 25 grams. The list shall include component name, type of plastic used, flame retardant type and CAS-number, plastic brand name and plastic model name. The list shall be signed by the applicant company's environmental manager.

7.2 Removed

7.3 Metallization of plastic housing and metal parts

Reason:

Recycling of used electronic products is an important environmental issue. Material recycling and reuse are the best options from an environmental point of view. Therefore TCO Development presents requirements that facilitate material recycling.

Metallization is a surface deposition process whereby a metallic layer is applied to the surface of a completed shaped plastic part. Examples of metallization processes are chemical coating and ion vapour deposition.

Applicability:

All printers.

Mandate:

The plastic housing shall not have internal or external metallization or moulded-in or glued metal parts.

Recommendation:

-

The following information shall be submitted:

A written guarantee that the above mandate is fulfilled. The document shall be signed by the applicant company's environmental manager.

8 TCO Document

8.1 Removed

8.2 Quality document accompanying the product

Reason: The purchaser of a product that has been certified in accordance with *TCO'99 - Printers* shall receive information concerning the quality and capabilities of the product. This information shall be based on the viewpoint from the user's perspective that TCO Development represents.

Applicability: All printers.

References: -

Mandate: A document written in English shall accompany the product, describing why just these requirements have been chosen for the products within the *TCO'99 - Printers* scheme, and what is expected to be achieved by them. The text is available in English on diskette, and can be obtained from TCO Development or from any *TCO'99 - Printers*-accepted laboratory.

Recommendation: -

The following information shall be submitted:

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

Test methods for office printers

1 Product Safety

1.1 Product safety

Method

The certification shall be made by a recognised/experienced testing laboratory within the CB scheme.

1.2 Radio interference

Method

The certification should be made by a recognised/experienced testing laboratory.

2 Ergonomics, Handling and Physical design

2.1 Controls - finding, reaching, identifying and using

Method

Measurement methods and measurable physical parameters are found in the following references:

- Nordic Guidelines for Computer Accessibility, Second Edition, 1998. Nordic Cooperation on Disability, Clas Thorén.
- Ergonomic requirements for office work with visual display terminals (VDTs) ISO 9241:1998
 - part 4: Keyboard requirements.
- Ergonomic Design of Control Centres (ISO 11064)
 - part 5: Displays, Controls, Interactions.
- Safety of machinery - Human physical performance
 - part I: Terms and definitions (prEN 1005-1)
 - part 2: Manual handling of machinery and component parts of machinery (PrEN 1005-2).
- Human Factors in Product Design, Elsevier 1991.
- The Swedish Agency for Administrative Development (Statskontoret), K: 146 Kravspecifikation 1998. Upphandling av persondatorer mm.

Terms and Definitions

Control positioning: Recommended vertical position is min. 900 mm and max. 1200 mm above floor level and max. 400 mm horizontal reach from the intended user position.

Control grouping: Gestalt principles as law of proximity, similarity and closure should be considered to support the understanding of control usage.

Control design: User expectations of control usage should be taken into consideration.

Control symbols: Contrast ratio shall exceed 3:1 and at least 6:1 is recommended.

Display information: The following characteristics shall be considered regarding visual information:

- **Clarity:** the information content is conveyed quickly and accurately
- **Discrimination:** the displayed information can be distinguished accurately
- **Conciseness:** user are given only the information necessary to accomplish the task
- **Consistency:** the same information is presented in the same way throughout the application, according to the user's expectations
- **Detection:** the user's attention is directed towards the information required
- **Legibility:** information is easy to read
- **Comprehensibility:** meaning is clearly understandable, unambiguous, recognisable, interpretable and recognisable

Access inside printer: If access inside the printer is required anthropometric data regarding hand/arm dimensions including functional movements must be considered.

It is recommended that clearance of paper jams etc. shall be done from outside the printer by providing a mechanism with sliding functionality.

2.2 The perception of alarms, warnings, status signals and error messages

Method

Measurement methods and measurable physical parameters are found in the following references:

- Nordic Guidelines for Computer Accessibility, Second Edition, 1998. Nordic Cooperation on Disability, Clas Thorén.
- Ergonomic requirements for office work with visual display terminals (VDTs) ISO 9241:1998
 - part 12: Presentation of information
 - part 13: User guidance.
- Ergonomic Design of Control Centres (ISO 11064)
 - part 5: Displays, Controls, Interactions.
- Human Factors in Product Design, Elsevier 1991.
- The Swedish Agency for Administrative Development (Statskontoret), K: 146 Kravspecifikation 1998. Upphandling av persondatorer mm..

2.7 Double-sided printing

Terms and Definitions

Automatic Duplex Mode: The mode in which the printer automatically prints texts/images on both sides of a sheet, by automatically sending the print sheet through the printer model. A printer model is considered to have an automatic duplex mode only if the printer model includes all accessories needed to satisfy the above conditions.

3 Emissions in the Working Environment

3.1 Emission of dust during normal operation

Method

The following methods can be used for measuring the emission of dust during normal operation:

- **Ral-UZ 85, Printers. Basic Criteria of RALXZ 85 for the Award of the Environmental Label.** Test conditions for Dust Concentration Measurements on Printers.
- **ASTM D 4532-92.**
- **Method for measuring the emission of ozone and dust from information technology equipment.** The test method was developed by the Danish Technological Institute and is in accordance with EN 1093-3. During normal operation, the emission rate of dust shall be a maximum of 0,15 µg/min. Address: Technological Institute, RO.Box 14 1, DK-2630 Taastrup, Denmark. Fax:+45-4350 7150.

3.2 Emission of ozone during normal operation

Method

The following methods can be used for measuring the emission of ozone during normal operation:

- **Ral-UZ 85, Printers. Basic Criteria of RAL-UZ 85 for the Award of the Environmental Label.** Test conditions for Ozone Concentration Measurements on Printers.
- **ASTM D 5156-91.**
- **Method for measuring the emission of ozone and dust from information technology equipment.** The test method was developed by the Danish Technological Institute and is in accordance with EN 1093-3. During normal operation, the emission rate of ozone shall be a maximum of 0,06 µg/min. Address: Technological Institute, RO.Box 141, DK-2630 Taastrup, Denmark. Fax:+45-4350 7150.

3.3 Acoustic noise from a printer

Method

Measured in accordance with:

- **ISO 7779, Acoustics - Measurement of airborne noise emitted by computer and business equipment.**

Declared in accordance with:

- **ISO 9296, Acoustics - Declared noise emission values of computer and business equipment.**

The measurements shall be performed according to ISO 7779 with the addition that sound power measurements only have to be performed in six microphone positions. The measurements can also be performed according to another standardised method with equal or higher precision.

A measure of the total amount of sound power emitted by a machine (sound source) when it is operating. The A-weighted sound power level for a sound source is given in bels, B (1 B = 10 dB). The reference sound power is 1 pW. A measure of the total amount of sound emitted by a machine (sound source) when it is operating. The A-weighted sound pressure level for a sound source is given in decibels, dB. The reference sound pressure is 20 µPa.

Sound pressure level

The declared A-weighted sound pressure level at the operator position shall be reported for the following modes of operation: Operational, standby and low-power mode. It should also be reported if the equipment emits broad band noise or if there are any significant discrete frequency components. If so, these frequencies shall be reported.

Additional information: For the sound pressure level measurements the sound source shall be placed on top of a standard test table according to ISO 7779, with the exception of large floor standing copiers intended to be placed on the floor. The sound pressure level obtained in practice will depend on the conditions of the room and the location of the sound source.

Terms and Definitions

Low-Power Mode: The low-power mode is the lowest power state the printer can automatically enter within some period of printer inactivity, without actually turning off. The printer enters this mode within a specified period of time after the last print was made. For purposes of determining the power consumption in this low-power mode, the company may choose to measure the lowest of either the energy-saver mode or the standby mode.

Standby Mode: The condition that exists when the machine is not making prints, has reached operating conditions and is ready to make a print, but has not yet entered into energy-saver mode. When the printer is in this mode, there will be virtually no delay before the printer is capable of making the next copy.

3.4 and 3.5 General test conditions for the measurements of the electric and magnetic fields

Condition for the test object and set up (both alternating electric/magnetic fields)

- The tests shall be performed with the printer working in the operational mode that produces the highest electric and magnetic fields, respectively. The mode shall be stated in the test reports.
- When the test object is connected via a detachable cable the measurement shall be performed with a non-shielded grounded cable of normal type.
- The mode(s) (e.g. automatic duplex mode) used during the test shall be stated in the report.
- The supply voltage and frequency used during the test shall be stated in the report.
- The power cable of the test object shall be connected to the phase and the neutral conductors of the mains power supply. If the mains plug permits an interchange of the live and neutral conductors, measurements shall be taken with that connection which gives the highest reading in band I.
- Distances are given in metres and angles in degrees.
- The printer-type and manufacturer shall be stated in the test reports.

Circumscribing box - box dimensions. In order to calculate the measurement distance, the measurements of an imaginary rectangular box that would precisely and with minimum possible volume circumscribe the test object. The underside of this imaginary box would be on the plane of the supporting table and its sides would be parallel to each of the test object sides. If the test object consists of several units, these shall be arranged in a way that represents normal usage. The test object, and its imaginary circumscribing box, has a front, two sides, a rear, a top and a bottom.

The number of measured points at each side depends on the dimensions of the test object and hence those of the imaginary circumscribing box.

Front and rear, width < 50 cm

Measuring distance: The distance is 50 cm, perpendicular to the front and rear of the box respectively.

Measurement positions: One, two or three measurement positions per side, depending on the height of the imaginary circumscribing box. In the centre of the front and rear sides respectively.

Box height, [cm]	Number of measurement positions per side	Measurement positions
< 50	1	Half the height
50-90	2	10 cm and 40 cm from the upper edge of the box
> 90	3	10 cm, 40 cm and 90 cm from the upper edge of the box

Front and rear, width ≥ 50 cm

Measuring distance: The distance is 50 cm, perpendicular to the front and rear of the box respectively.

Measurement positions: Three, six or nine measurement positions per side, depending on the height of the box. At the centre of the side plus two positions located 10 cm from the respective edges of the front and rear sides.

Box height, [cm]	Number of measurement positions per side	Measurement positions
< 50	3	Half the height
50-90	6	10 cm and 40 cm from the upper edge of the box
> 90	9	10 cm, 40 cm and 90 cm from the upper edge of the box

Sides, width < 50 cm

Measuring distance: The distance is 50 cm, perpendicular to the box sides.

Measurement positions: One, two or three measurement positions per side, depending on the height of the box. At the centre of the side.

Box height, [cm]	Number of measurement positions per side	Measurement positions
< 50	1	Half the height
50-90	2	10 cm and 40 cm from the upper edge of the box
> 90	3	10 cm, 40 cm and 90 cm from the upper edge of the box

Sides, width ≥ 50 cm.

Measuring distance: The distance is 50 cm, perpendicular to the sides of the box.

Measurement positions: Three, six or nine measurement positions per side depending on the height of the box. At the centre of the side plus two positions 10 cm from the edges of the sides.

Box height, [cm]	Number of measuring positions per side	Measuring positions
< 50	3	Half the height
50-90	6	10 cm and 40 cm from the upper edge of the box
> 90	9	10 cm, 40 cm and 90 cm from the upper edge of the box

3.4 Alternating electric fields

Method

The true RMS-value of the amplitude of the electric field strength, at the surface of the measuring probe, is measured in front of the test object for band I at a distance of 50 cm, and at the distance of 50 cm around the test object for band II. The frequency ranges are selected by means of filters in the measuring equipment.

The co-ordinates are given for the centre of the measuring probe. The surface of the probe shall be perpendicular, within ± 5 degrees, to the radial axis. The equipment under test 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 equipment under test, but which are not part of the test, shall be placed so far away from the measuring set-up 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. The cables between the measuring probe and the measuring instrument shall be positioned in such a way that they do not influence the measured value.

Background electric field strengths in the test laboratory, 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 of the copier under test shall be within $\pm 3\%$ of its nominal value. The nominal value of the main voltage used shall be specified in the test report.

The equipment under test shall be connected to the mains via a cable that shall be laid horizontally for a distance of 0.1 m perpendicular to the test object and then vertically downwards for at least 1 m. If the printer is a floor-standing model the mains power cable shall be laid out perpendicular to the centre of the rear face.

Equipment

The alternating electric field emission from the equipment under test 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 A. 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 all connected to earth. 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 according to $U = \epsilon * E * A / C$ where C is the capacitance in the feedback loop of the operational amplifier and ϵ is the permittivity for a vacuum.

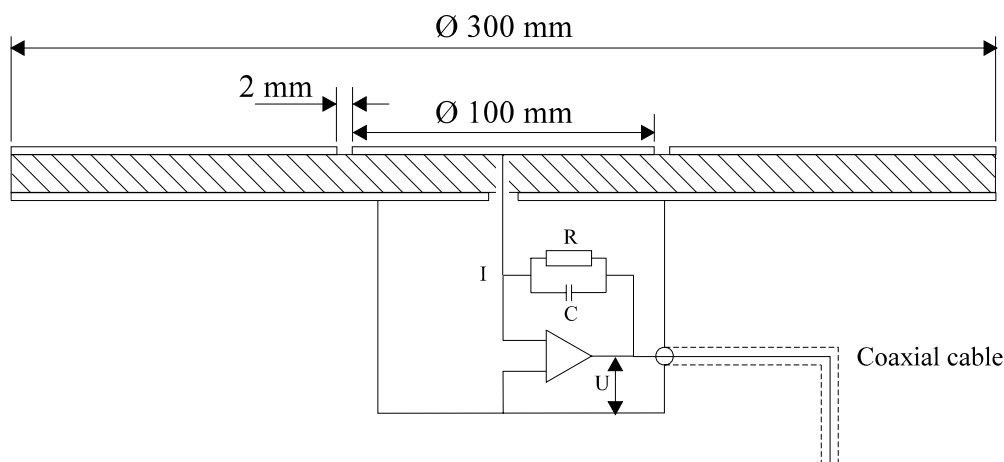


Figure A. Sketch and circuit principle of the measuring probe for alternating electrical field measurements. The feedback circuit of the operational amplifier is a capacitance C in parallel with a high value resistor R to ensure that there is no DC voltage across the plates of the capacitor C.

The specifications for the frequency response of the measuring probe are given by the calibration procedure. The signals from the probe shall be filtered by high-pass and low-pass filters. The specifications of the filters are given in Table A.

Table A. Filter specifications

Frequency band I

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

Frequency band II

<i>Frequency</i>	< 2 kHz	2 kHz	30 kHz	400 kHz	> 400 kHz
<i>Attenuation</i>	> 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 RMS-value of the electric field strength in both frequency bands.

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

The measuring system shall be capable of measuring 2.0 V/m in band I and 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 with at least 300 mm diameter. The distance between the surface of the probe and the plate shall not exceed 30 mm.

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

Table B. Calibration frequencies and amplitudes

	Frequencies	Amplitudes
Band I	50, 100, 500, 1000 Hz	25, 250 V/m
Band II	15, 30, 60, 120 kHz	2.5, 10, 25 V/m

Recorded values at these calibration points shall be within $\pm 5\%$ of the nominal value. Due to the nature of the specified filters the deviation shall be calculated at 1 kHz from 22.5 and 225 V/m and at 120 kHz from 2.4, 9.5 and 24 V/m.

Results

Results shall be presented as RMS-values of the alternating electric field expressed in volts per meter (V/m). The measured values are for normal operation of the equipment under test. The measured values in front of the equipment at the user's place (max. three values) and the maximum value for each side with its relative position shall be presented.

If the measured values are less than 10 V/m in band I or less than 1.0 V/m in band II the result shall be reported as " ≤ 10 V/m" or " ≤ 1.0 V/m", respectively.

Measurement uncertainty:

The test shall be performed in such a way that the total uncertainty in the test result will be better than $\pm (10\%$ of reading + 1.5 V/m) for band I and $\pm (10\%$ of reading + 0.10 V/m) for band II.

3.5 Alternating magnetic fields*Method***Test laboratory**

Background magnetic fields in the test laboratory, 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. The true RMS value of the amplitude of the magnetic flux density vector, is measured in front of the test

object and at both sides. The measuring distances are always 30 cm in band I and II. The frequency ranges are selected by means of filters in the measuring equipment. The measuring coils shall be stationary during the measurements.

Equipment

The magnetic field shall be measured with two coil systems, one- covering band I and the other band II. Each coil system shall consist of three mutually perpendicular concentric circular coils each with an area of 0.01 m². 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 be greater than 12 kHz for band I and greater than 2.5 MHz for band II. The resonances shall be suppressed by resistive loading of each coil.

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 A.

Table A. 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, integration and filtering, the signals from the three coils in each coil set shall be used as input values for calculating the RMS-value of the amplitude of the magnetic flux density vector in both frequency bands. It is permissible to calculate the RMS-value for each of the coil signals and use the root of the squared sum of those RMS-values as the test result.

The measuring time shall be sufficiently long to enable measurement with an accuracy of ± 5 % at 50160 Hz.

The measuring system shall be capable of measuring 40 nT in band I and 5 nT in band II.

The measuring system shall be calibrated using a Helmholtz-type calibration coil as shown in Figure A. Calibration shall be performed with sinusoidal fields at the amplitudes and frequencies specified in Table B.

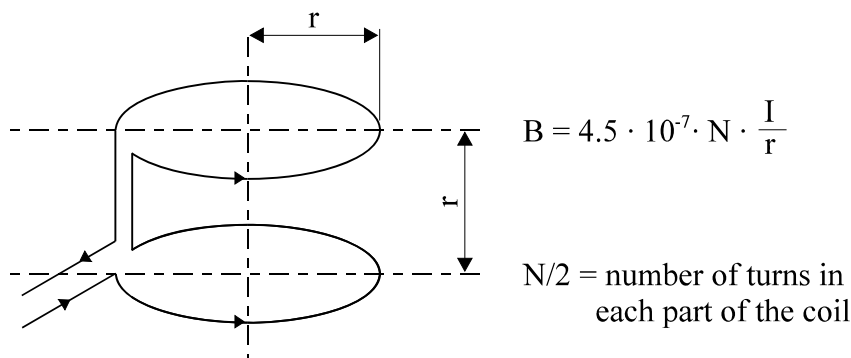


Figure A. Calibration set-up.

Table B. 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 $\pm 5\%$ from the nominal value. Due to the nature of the specified filters the deviation at 1kHz 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.

Results

Results shall be presented as RMS-values of the magnetic flux density expressed in nanotesla (nT) for the two frequency bands. The values in front of the equipment under test at the user's position (max. three values) and the maximum value for each side and its position shall be given for normal operation. If measured values are less than 200 nT in band I or less than 10 nT in band II the result shall be reported as " ≤ 200 nT" and " ≤ 10 nT" respectively.

Measurement uncertainty

The test shall be performed in such a way that the total uncertainty in the test result will be better than $\pm (10\%$ of reading + 30 nT) for band I and $\pm (10\%$ of 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.

3.6 Energy saving

Method

The certification shall be made by a recognised/experienced testing laboratory. The methods used are:

- US EPA Energy Star Program for Printers/Faxes Machines. Memorandum of Understanding (MOU), October 2nd, 1995.
- Swiss Energy 2000, Labelling criteria for printers, April 6th 1999.

Terms and Definitions

Low-Power Mode: The low-power mode is the lowest power state the printer can automatically enter within some period of printer inactivity, without actually turning off. The printer enters this mode within a specified period of time after the last copy was made. For purposes of determining the power consumption in this low-power mode, the company may choose to measure the lowest of either the energy-saver mode or the standby mode.

Off Mode: Off mode is used by Swiss Energy 2000. Off mode means the operating mode in which the main switch of the printer is off.

Auto-off Feature: The auto-off feature is defined as the ability for the printer to automatically shut itself off within a specified period of time after the last copy was made. The copier shall automatically enter its off mode after execution of this feature.

Standby Mode: Operating mode in which the printer is switched on and ready for operation, and into which it automatically switches after printing has been completed.

Default Times: The time period set by the manufacture prior to shipping that determines when the printer will enter its various modes, i.e., the low-power mode, the off mode, etc. Both the off mode default times and the low-power mode default times shall be measured from the time the last copy was made.

Recovery Time: The amount of time needed to bring the printer from a low-power/off mode to the standby mode.

Automatic Duplex Mode: The mode in which the printer automatically prints text/ images on both sides of a sheet, by automatically sending the printed sheet through the printer model. A printer model is considered to have an automatic duplex mode only if the printer model includes all accessories needed to satisfy the above conditions, i.e., an automatic document feeder and accessories for automatic duplexing capabilities.

4 - 7 Environmental chapters

Terms and Definitions

Available: If the latest version of a particular document is present at the accredited ecological laboratory no such new document is needed for the next application.

Submitted: The document shall be submitted for each and every application.

Plastic component: Components made principally of plastics, e.g. the *housing*. *Components* containing other materials in any significant amounts, e.g. cables with their metal conductors, are not included in the requirements.

Printed circuit board: See printed wiring board. The term "printed circuit board" is not used in the text in order to prevent its abbreviation (PCB) from being mistaken for poly-chlorinated biphenyls.

Printed wiring board: A printed board that provides point-to-point connections but not printed components in a predetermined arrangement on a common base (IPC).

Printed wiring board assembly: An assembly that uses a printed wiring board for component mounting and interconnection purposes (IPC).

PBB and PBDE

Decabromodiphenyl ether (decaBDE) CAS no 1163-19-5 is not allowed even if EU has decided to exempt it from the EU Directive 2002/95/EC (RoHS).

Monobromodiphenyl ether (monoBDE)	CAS no 101-55-3
Dibromodiphenyl ether (diBDE)	CAS no 2050-47-7
Tribromodiphenyl ether (triBDE)	CAS no 49690-94-0
Tetrabromodiphenyl ether (tetraBDE)	CAS no 40088-47-9
Pentabromodiphenyl ether (mentaBBDE)	CAS no 32534-81-9
Hexabromodiphenyl ether (hexaBDE)	CAS no 36483-60-0
Heptabromodiphenyl ether (heptaBDE)	CAS no 68928-80-3
Octabromodiphenyl ether (octaBDE)	CAS no 32536-52-0
Nonabromodiphenyl ether (nonaBDE)	CAS no 63936-56-1
Decabromodiphenyl ether (decaBDE)	CAS no 1163-19-5
Decabromobiphenyl (DeBB)	CAS nr 13654-09-6

References

1. EN 60 950 (IEC 60 950), Safety of information technology equipment, including electrical business equipment.
2. Human Factors in Product Design, Elsevier 1991.
3. ISO 7779, Acoustics - Measurement of airborne noise emitted by computer and business equipment.
4. ISO 9241:1998, Ergonomic requirements for office work with visual display terminals (VDTs)
 - part 4: Keyboard requirements.
 - part 12: Presentation of information
 - part 13: User guidance.
5. ISO 9296, Acoustic - Declared noise emission values of computer and business equipment.
6. ISO/WD 11064, Ergonomic Design of Control Centres
 - part 5: Displays, Controls, Interactions.
7. MPR 1990:8, section 2.05, Test methods for Visual Display Units.
8. Nordic Guidelines for Computer Accessibility, Second Edition, 1998. Nordic Cooperation on Disability. Editor: Clas Thorén.
9. PrEN 1005, Safety of machinery - Human physical performance
 - part 1: Terms and definitions (prEN 1005-1)
 - part 2: Manual handling of machinery and component parts of machinery (PrEN 1005-2).
10. Ral-UZ 85, Printers. Basic criteria of RAL-UZ 85 for the award of the environmental label, 1996. *Blue Angel*.
11. The Swedish Agency for Administrative Development (Statskontoret), K: 138 Kravspecifikation 1996. Upphandling av persondatorer mm.
12. The Swedish Agency for Administrative Development (Statskontoret), K:146, Kravspecifikation 1998. Upphandling av persondatorer m m.
13. Swiss Energy 2000, Labelling criteria for printers, April 6th 1999.
14. TCO, Screen Facts, 1991.
15. TCO'99 Certification, Report No. 1. DISPLAY (CRT), First Edition, 1998.
16. TCO'99 Certification, Report No. 2. DISPLAY (flat), First Edition, 1998.
17. TCO'99 Certification, Report No. 3. SYSTEM UNITS, First Edition, 1998.
18. TCO'99 Certification, Report No. 5. ECOLOGY for Displays, System Units and Keyboards, First Edition, 1998.
19. US EPA Energy Star Program for Printers/Faxes Machines. Memorandum of Understanding (MOU), October 2nd, 1995.
20. EU Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Template documents for use when applying for TCO'99 - Printers Scheme Approval of Printers

The following pages contain the complete set of templates needed for the requirements from 1. 1 to 8.2 when applying for the *TCO'99 - Printers* quality and environmental labelling of printers for office use.

1 Product safety

1.1 Product safety

A copy of the EN 60 950 certificate issued by a recognised testing laboratory [within the CB scheme] showing date, name and address of testing laboratory, responsible person, brand and model name of the tested unit. This document has been signed by the person responsible for product quality at the manufacturing company. This is a mandatory requirement.

Signature Name and title in block capitals

Date Company

1.2 Radio interference

A copy of the EN 55 022, Limit Class B certificate, issued by a recognised/experienced testing laboratory showing date, name and address of testing laboratory, name of responsible person, brand and model name of the tested unit. This document has also been signed by the person responsible for product quality at the manufacturing company. This is a recommendation.

Signature Name and title in block capitals

Date Company

2 Ergonomics, Handling and Physical design

2.1 Controls - finding, reaching, identifying and using

2.2 The perception of alarms, warnings, status signal and error messages

2.1 - 2.2(a) Responsibility

The applicant company and/or its partners has recourse to the competence and organisation necessary to ensure a high level of service for disabled people. The company is aware of its product's possibilities and facilities for reducing the effects of disability. This document has been signed by the production manager at the manufacturing company concerned. This is a mandatory requirement.

- The applicant company has its own competence within this area.
- The applicant company has a partner with competence in this area.

Name of the person responsible
for questions concerning disabled users

Partner's name and address
in block capitals

Signature

Name and title in block capitals

Date

Company

2.1 - 2.2(b) Requirements concerning operating controls

We hereby guarantee that the following requirements are fulfilled. This guarantee has been signed by the production manager at the manufacturing company concerned. These are mandatory requirements.

Requirements:

Controls -finding, reaching, identifying and using

1. The surfaces of the controls shall not contain chromium, nickel or other material which may cause an allergic reaction.
2. Controls shall be placed so that they can easily be reached by, for example, a short person or a person sitting in a wheelchair.
3. The size, shape and surface of controls shall be designed so that they are easily grasped when they are used as intended.
4. Controls operated by keys shall have an operating force and a travel characteristic. The operating force shall not exceed 2.0 Newton. Touch-sensitive keys are not recommended.
5. Controls shall be located (grouped), designed and marked in a way that is logical for their intended use.
6. Legends on operating controls shall be easy detectable by use of contrast and symbols. It shall be possible to arrange controls with tactile symbols (such as Braille for visually disabled persons).
7. Controls shall be marked so that their settings can be easily identified by touch.
8. Status information on displays should enable the user to perform perceptual tasks effectively, efficiently and with satisfaction.
9. Mechanism employing latches for opening and closing shall not require the simultaneous use of two hands.
10. Handles or cut-outs for opening and closing shall not have sharp edges or pose a risk of compressing the fingers.

The perception of alarms, warnings, status signals and error messages

1. Signals from the basic system (apart from the application program), such as alarms, warnings, status lamps and error messages, have the following characteristics:
 - Alternative forms - auditory, visual or tactile - are available, allowing both visually and hearing impaired persons to adapt the signalling to their perceptive characteristics.
 - The volume, and where possible also the pitch and frequency, of auditory output is adjustable.
 - Visual signals are placed where they are easily perceived.
2. Warnings and similar alert messages will remain stable for a sufficiently long time to be noticed by the user.
3. It shall be possible to show alarms from the printer on the display of the workstation.

Signature

Name and title in block capitals

Date

Company

- 2.3 Printer location**
- 2.4 Access inside the printer, e.g. to clear a paper jam**
- 2.5 Self-test function for fault finding**

We hereby guarantee that the following requirements are fulfilled. This guarantee has been signed by the production manager at the manufacturing company concerned. These are mandatory requirements.

Requirements:

2.3 Printer location

The printer can be placed against a wall without needing to be moved for normal use and maintenance.

2.4 Access inside the printer, e.g. to clear a paper jam

It is easy and safe to gain legitimate access into the printer, without fingers or hands being squeezed or cut, and in the case of a paper jam, without erasing information that may be stored electronically in the printer.

2.5 Self-test function for fault finding

The printer has a self-test function for fault finding, i.e. for assisting the user to solve the problem.

Signature

Name and title in block capitals

Date

Company

2.6 Printing on recycled paper

We hereby guarantee that the printer can print with the same level of quality on paper with a content of up to 20 % recycled fibre as on paper that is not manufactured using recycled fibre. This guarantee shall be signed by the production manager at the manufacturing company concerned. This is a mandatory requirement.

.....
Signature Name in block capitals

.....
Date Company

2.7 Double-sided printing

We hereby guarantee that the printer automatically can print with the same high quality on both sides of a sheet of paper as it passes through the printer. This guarantee shall be signed by the production manager at the manufacturing company concerned. This requirement is a recommendation, but nevertheless receives extremely strong support from TCO Development.

Signature Name and title in block capitals

Date Company

3 Emissions in the Working Environment

3.1 Emission of dust during normal operation

We hereby guarantee that the printer fulfils the mandatory requirements of emission of dust during normal operation.

A copy of the test report from a test of the emission of dust from the printer during normal operation in accordance with the method described in RAL-UZ 85, ASTM D 4532-92 or the method devised by The Danish Technological Institute. The test report has been issued by a recognised testing laboratory accredited in accordance with EN 45 001 or ISO/IEC Guide 25, showing the date, name of responsible person, name and address of testing laboratory, brand and model name of the tested unit. This document has been signed by the person responsible for product quality at the applicant company. This is a mandatory requirement.

----- Signature	----- Name and title in block capitals
----- Date	----- Company

3.2 Emission of ozone during normal operation

We hereby guarantee that the printer fulfils the mandatory requirements of emission of ozone during normal operation. A copy of the test report from a test of the emission of ozone from the printer during normal operation, in accordance with the method described in RAL-UZ 85, ASTM D 4532-92 or the method devised by The Danish Technological Institute. The test report has been issued by a recognised testing laboratory accredited in accordance with EN 45 001 or ISO/IEC Guide 25, showing the date, name of responsible person, name and address of testing laboratory, brand and model name of the tested unit. This document has been signed by the person responsible for product quality at the applicant company. This is a mandatory requirement.

----- Signature	----- Name and title in block capitals
----- Date	----- Company

3.3.1-3 **Acoustic noise from the laser/ink-jet/matrix printer**

We hereby guarantee that the printer fulfils the mandatory requirements of acoustic noise emitted from the printer.

A copy of the test report from a test of the acoustic noise emission from the printer during normal operation, in accordance with the method described in ISO 7779, *Acoustics - Measurement of airborne noise emitted by computer and business equipment* with the qualification that sound power measurements were only required to be performed in six microphone positions. The measurements may instead have been performed in accordance with another standardised method with equal or higher precision. The values are declared in accordance with ISO 9296, *Acoustic - Declared noise emission values of computer and business equipment*. The test report has been issued by a recognised testing laboratory accredited in accordance with EN 45 001 or ISO/IEC Guide 25, showing the date, name of responsible person, name and address of testing laboratory, brand and model name of the tested unit. This document has been signed by the person responsible for product quality at the applicant company. This is a mandatory requirement.

Signature

Name and title in block capitals

Date

Company

4 The Applicant Company's Environmental Management System Certification

4.2 Available Documents

A list of the latest versions of the documents that are available at the accredited laboratory. This list has been signed by the applicant company's environmental manager.

Document	Signed by	Date	Company
Environmental certification			

Manufacturing Plant	Manufacturing Plant location

Signature

Name and title in block capitals

Date

Company

4.2 Environmental Management System Certification

A copy of the ISO 14001 or EMAS certificate and a copy of the manufacturing plant's environmental policy signed by the company's general manager. These documents have been signed by the environmental manager for the applicant company.

Signature

Name and title in block capitals

Date

Company

6 Environmental Hazards

6.1 Mercury, Cadmium and Lead in Batteries

6.1(a) Substances in Batteries

We hereby guarantee that none of the batteries in the product for which *TCO'99 - Printers* labelling approval is being sought contain mercury, cadmium or lead. This guarantee has been signed by the environmental manager of the applicant company.

Signature

Name and title in block capitals

Date

Company

or

6.1(b) No Batteries Statement

We hereby state that there are no batteries in the product for which *TCO'99 - Printers* labelling approval is being sought. The requirement specified in Section 6. 1 (a) is therefore not applicable. This document has been signed by the environmental manager of the applicant company.

Signature

Name and title in block capitals

Date

Company

6.2 Mercury, cadmium, lead, and hexavalent chromium in the product

6.2(a) Mercury, cadmium, lead, and hexavalent chromium in the product

We hereby guarantee that the product for which *TCO'99 -Printers* labelling approval is being sought does not contain mercury, cadmium, lead or hexavalent chromium. This guarantee has been signed by the environmental manager of the applicant company.

----- Signature	----- Name and title in block capitals
----- Date	----- Company

6.2 Mercury, cadmium, lead, and hexavalent chromium in the product

6.2(b) Ascertainment

A document describing the work or process carried out to ascertain that the product for which *TCO'99 -Printers* labelling approval is being sought does not contain mercury, cadmium, lead or hexavalent chromium is appended here. This document has been signed by the environmental manager of the applicant company.

The following process has been used by [company name] to ascertain that the product does not include mercury, cadmium, lead or hexavalent chromium...

----- Signature	----- Name and title in block capitals
----- Date	----- Company

6.3 Flame Retardants in Plastic Components

6.3(a) Organically Bound Chlorine or Bromine

We hereby guarantee that the plastic components in the product for which *TCO'99 - Printers* labelling approval is being sought weighing more than 25 grams do not use flame retardants that contain organically bound chlorine or bromine and that the product does not contain PBB and PBDE. This guarantee has been signed by the environmental manager of the applicant company.

See also, 7.1

Signature

Name and title in block capitals

Date

Company

6.3 Flame Retardants in Plastic Components

6.3(b) Ascertainment

A document describing the process carried out to ascertain that none of the plastic components weighing more than 25 grams include flame, retardants that contain organically bound chlorine or bromine and that the product does not contain PBB and PBDE is appended here. This document has been signed by the environmental manager of the applicant company.

The following process has been used by [company name] to ascertain that none of the plastic components weighing more than 25 grams include flame retardants that contain organically bound chlorine or bromine and that the product does not contain PBB and PBDE.

Signature

Name and title in block capitals

Date

Company

6.4 Flame Retardants in Printed Wiring Boards

6.4(a) Organically Bound Chlorine or Bromine

We hereby guarantee that the printed wiring boards in the product for which *TCO'99 - Printers* labelling approval is being sought do not use flame retardants that contain organically bound chlorine or bromine. This guarantee has been signed by the environmental manager of the applicant company.

----- Signature	----- Name and title in block capitals
----- Date	----- Company

6.4 Flame Retardants in Printed Wiring Boards

6.4(b) Ascertainment

A document describing the process carried out to ascertain that none of the printed wiring boards include flame retardants that contain organically bound chlorine or bromine is appended here. This document has been signed by the environmental manager of the applicant company.

The following process has been used by [company name] to ascertain that none of the printed wiring boards include flame retardants that contain organically bound chlorine or bromine

----- Signature	----- Name and title in block capitals
----- Date	----- Company

7 Preparation for Recycling

7.1 Labelling of Plastics

7.1(a) Plastic Labelling List

A list of all the plastic components in the product that weigh more than 25 grams is appended. The list includes the component name, weight, type of plastic used, flame retardant type and CAS-number, plastic brand name and model name. Information given here is also used for evaluation of requirement 6.3. The list has been signed by the environmental manager of the applicant company.

Plastic component name	Weight (grams)	Type of plastic	Flame retardant type	Flame retardant CAS-number	Plastic brand name	Plastic model name	Plastic labelling text

Signature

Name and title in block capitals

Date

Company

7.1 Labelling of Plastics

7.1(b) Written Guarantee

We hereby guarantee that no plastic components of any size contain chlorinated or brominated polymers, e.g. PVC. We also guarantee that all plastic components weighing more than 25 grams are labelled in accordance with ISO 11469, ISO 1043-1, ISO 1043-2, ISO 1043-3 and ISO 1043-4. This guarantee has been signed by the environmental manager of the applicant company.

Signature

Name and title in block capitals

Date

Company

7.3 Metallized Plastic Housings

We hereby guarantee that there is no internal or external metallization of the plastic housing or moulded-in or glued metal parts to the plastic housing . This guarantee has been signed by the environmental manager of the applicant company.

Signature

Name and title in block capitals

Date

Company

8 TCO Document

8.2 Written Quality Document Accompanying the Products

We hereby guarantee that the written quality document from TCO Development, describing why just these requirements have been chosen for the products, and what is expected to be achieved by them, will accompany the products. This guarantee has been signed by the responsible person or quality manager for the applicant company.

Signature

Name and title in block capitals

Date

Company