

ECMA

Standardizing Information and Communication Systems

Product-related environmental attributes

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attributes**

Brief History

The increased interest of public and institutional customers in environmental information stimulated the set up of an ECMA Technical Committee working on the definition of product-related environmental attributes. This Group, ECMA TC38, was formally set up by the ECMA General Assembly in December 1995 and includes experts from information technology, telecommunications and consumer electronics.

This Technical Report focuses on two main items:

- a catalogue of parameters related to environment that are recommended for inclusion in data sheets and specification sheets of products;
- a set of recycling relevant data recommended for end-of-life and recycling of products.

Annex A presents examples of declarations of products environmental requirements for personal computers, printers, copier equipment and television sets.

This ECMA Technical Report has been adopted by the ECMA General Assembly of 26th June 1997.

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1 Scope

This Technical Report identifies and describes environmental attributes and associated measurement methods related to the use and end-of-life of information and communication technology and consumer electronic products, according to known standards, guidelines and currently accepted practices.

The environmental attributes include

- energy consumption;
- emissions;
- data on materials;
- packaging data;
- end-of-life data.

Although the attributes are listed without differentiation between product categories, it should be recognized that not all attributes necessarily apply to each product category.

The documented sample declarations in annex A may serve as guidance for a proper application of this Technical Report.

2 References

This clause lists the documents that are referred directly to in the body of this Technical Report. For other documents of interest, see annex C.

2.1 ECMA Standards and Technical Reports

Standards

ECMA-74	Measurement of airborne noise emitted by computer and business equipment (ISO 7779)
ECMA-108	Measurement of high frequency noise emitted by computer and business equipment (ISO 9295)
ECMA-109	Declared noise emission values of computer and business equipment (ISO 9296)

Technical Reports

ECMA TR/56	Recommended measuring method for Ozone emissions
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2.2 ISO Standards and DISs

ISO/DIS 3741	Acoustics - Determination of sound power levels of noise sources using sound pressure - Precision methods for broad-band sources in reverberation rooms (mainly continuous)
ISO 3742:1988	Determination of sound power levels of noise sources - Precision methods for discrete-frequency and narrow-band sources in reverberation rooms (mainly discontinuous)
ISO 3744:1994	Acoustics - Determination of sound power levels of noise sources using sound pressure - Engineering method in an essentially free field over a reflecting plane
ISO 3745:1977	Acoustics -- Determination of sound power levels of noise sources -- Precision methods for anechoic and semi-anechoic rooms
ISO 4871:1996	Acoustics - Declaration and verification of noise emission values of machinery and equipment
ISO 7574:1985	Acoustics - Statistical methods for determining and verifying stated noise emission values of machinery and equipment (five parts)
ISO/DIS 7779	Measurement of airborne noise emitted by computer and business equipment
ISO 9295:1988	Measurement of high frequency noise emitted by computer and business equipment
ISO 9296:1988	Declared noise emission values of computer and business equipment
ISO 11469:1993	Plastics - Generic identification and marking of plastic products
ISO 11690-1:1996	Acoustics - Recommended practice for the design of low-noise workplaces containing machinery - Part 1: Noise control strategies
ISO 11690-2:1996	Acoustics - Recommended practice for the design of low-noise workplaces containing machinery - Part 2: Noise control measures
ISO/DIS 14021	Environmental labels and declarations - Self-declaration environmental claims - Guidelines and definition and usage of terms
ISO/DIS 14040	Environmental management - Life cycle assessment - Principles and framework

- ISO/DIS 14050 Environmental management - Vocabulary
- 2.3 IEC Standards**
- IEC 107-1:1977 Recommended methods of measurement on receivers for television broadcast transmissions. Part 1: General considerations. Electrical measurements other than those at audio-frequencies
- IEC 950:1991 Safety of information technology equipment including electrical business equipment
- 2.4 CEN/CENELEC**
- EN 45014 General criteria for suppliers declaration of conformance
- EN 55022 Limits and methods of measurement of radio disturbance characteristics of information technology equipment (IEC CISPR 22: 1993)
- EN 60950 Safety of information technology equipment including electrical business equipment
- 2.5 European Union (EU)**
- 75/442/EEC European Union directive on waste
- 91/157/EEC European Union directive on batteries and accumulators
- 91/689/EEC European Union directive on hazardous waste
- 93/86/EEC European Union directive adaptation to technical progress on batteries and accumulators containing certain dangerous substances
- 2.6 Germany**
- RAL-UZ 62 Basic criteria for the award of the environmental label - Copier equipment; German Federal Environmental Protection Agency through German Institute for Quality Assurance and Marking (RAL)
- 2.7 Sweden**
- MPR II 1990:8/10 Testing emissions and other properties of VDU's
- SS 4361490 Computers and Office machines - Measuring methods for electric and magnetic near field
- 2.8 United States Environmental Protection Agency (US EPA)**
- Energy Star MOU Memorandum of Understanding for energy efficient office equipment

3 Definitions

For the purposes of this Technical Report the following definitions apply.

3.1 Modes of operation

3.1.1 ON mode ≡ operational mode

A state in which the device performs its normal duties.

3.1.2 Inactive modes

3.1.2.1 Sleep mode

The operating mode with the lowest energy consumption and into which the machine switches after a period of inactivity and from which the machine can return to its original mode (may be referred to as idle state for some machines).

3.1.2.2 Standby mode

A state from which a machine can re-start performing its normal operation without any warm-up time.

3.1.2.3 Standby passive mode

The appliance is connected to a power source producing neither sound nor vision but is waiting to be switched to **OFF**, **standby active** or **ON mode**, by an action from the consumer, e.g. via the remote control.

3.1.2.4 Standby active mode

The appliance is connected to a power source and is in active mode, communicating, for part or all of the time, with an external signal, but produces neither sounds nor vision.

3.1.3 OFF mode

The mode with the lowest energy consumption when the device is connected to the electrical supply.

3.2 Emissions

Physical or chemical releases from products.

3.2.1 Physical emissions

3.2.1.1 Acoustical noise

Unwanted sound in the human audible frequency range.

3.2.1.2 Noise emissions

Airborne sound radiated into the environment from a defined source (machine or equipment). (ISO 11690)

3.2.2 Chemical emissions

3.2.2.1 Air emissions

Release of gases, vapours, and particulates from point or diffuse sources.

3.2.2.2 Dust

Solid total airborne particles.

3.3 Recycling

Set of processes for reclaiming material, that would otherwise be disposed of as waste, as a material input to the manufacture of products (cf. ISO/DIS 14040, ISO/DIS 14050).

NOTE

The word recycling is also used for a set of processes handling components, sub-assemblies or modules instead of raw material for manufacturing new products.

3.4 Recovery

The operation of reuse, recycling, recovery of calorific value or composting, which is carried out on used materials. Recovery does not include collecting. (cf. CEN TC 261/SC 1/WG 1).

3.5 Environment

Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation. (cf. ISO 14001)

3.6 Reuse

The use of a previously used product or component for its original or different purpose without any change of its composition.

3.7 Refurbishing

Renewing/Reworking of products or components; may be combined with an upgrading.

3.8 Waste

Anything for which the generator has no further use and which is disposed of or released to the environment. (cf. ISO/DIS 14021).

NOTE

Under the current EU waste directive, there is a distinction between waste for recovery and waste for disposal (75/442/EEC, 91/689/EEC).

3.9 Disposal

The ultimate operation on waste, may be accomplished by appropriate landfill techniques, incineration, pyrolysis or chemical conversion with or without recovery of material content or energy.

3.10 Hazardous material

Hazardous materials are those materials (e.g.: corrosive, explosive, reactive, radioactive, carcinogenic, mutagenic, teragenic or an ecotoxic or containment pursuant) that are governed by various country regulations.

3.11 Module

Item consisting of several parts with a complex function in itself (like power-supply, drive).

3.12 Sub-assembly

Item consisting of several parts without a complex function (like housing, TV-chassis).

3.13 Part

Any piece with a function, which one cannot disassemble without destroying the function of the whole product.

3.14 Component

See "Part", but usually used only for electrical parts.

3.15 Fraction

Any material stream coming out of a dismantling or separation process, like metals, plastic, glass.

3.16 Remanufacturing

Equipment has been factory disassembled, cleaned and reassembled using new, recycled and/or remanufactured components that have been inspected and tested to assure their performance. The features, functions, identity and Catalogue Number remain unchanged. (cf. American Electronics Association)

3.17 Energy consumption

The number of watts (rms) required drawn from the power source in a particular mode of operation.

4 Acronyms and abbreviations

4.1 Acronyms

- CFC Chlorofluorocarbons
- ELF extra low frequency
- EMC electromagnetic compatibility
- HCFC hydrogenated chlorofluorocarbons
- PCB polychlorinated biphenyls
- PCT polychlorinated terphenyls
- VLF very low frequency

5 Recommendations

The following information should be included in a suppliers declaration, as far as these are relevant to the specific product categories.

5.1 Product information/description

The following should be provided where applicable. This list should include, but not be limited to:

- type of product;
- brand name;
- model number;
- seller (or the placer of the product onto the market)/manufacturer;
- weight and dimensional characteristics (kg and cm);
- statement that mechanical plastic parts heavier than 25 g are marked according to ISO 11469.

5.2 Upgradability/Extendibility

The design considerations of the basic unit, which allow the product features and product capability/profile to be enhanced, should be listed.

The service warranty/policy offered by the manufacturer should be listed.

5.3 Energy Consumption

All relevant products and equipment should list the energy consumption in watts appropriate to the product type and as defined in the definition clause.

Some examples are:

TVs	Monitors	Computers	Copiers	Printers
On	Operational	Sleep	Operational	Stand by
Standby passive	Standby	Off	Standby	Off
Off	Sleep		Off	
	Off			

Measurement should be performed using the procedure specified by the EPA Energy Star program for appropriate products, including the methods for operational modes. For TV sets publication IEC 107-1 should be used.

If a product contains multiple levels of energy saving modes, these should be listed in the product declaration.

Products following any other guidelines can list this information with the appropriate measurement in the appropriate section(s) of the product declaration (see annex A). The measurement protocols associated with these guidelines should be followed.

5.4 Electromagnetic emissions

5.4.1 ELF/VLF electromagnetic emissions

Public perception and increased requests from customers related to magnetic field emissions, which emanate from monitors have led to the Swedish guideline MPR II - 1990:8 for Band I and II ranges in both alternating electric and magnetic fields. Alternatively, the Swedish standard SS 436 14 90 may be adopted. A declaration shall be made as appropriate to the relevant standard and referenced in annex A.

5.4.2 Radio frequency emissions and immunity

The international standard for radio frequency emissions from information technology equipment, is CISPR-22, which is equivalent to EN55022. This standard is effectively a legal requirement in the European Union and in most parts of the world. The legislation and relevant standards, shall be recorded in the suppliers declaration as referenced in annex A.

5.5 Physical emission

5.5.1 Acoustical Noise

Noise emission information for relevant products should be provided as sound power levels and emission sound pressure levels. Measurement should be made according to standards ECMA-74 (ISO 7779) and ECMA-108 (ISO 9295) and declared according to standard ECMA-109 (ISO 9296).

Standards ISO 3741 and 3742 should be used for some products, e.g. TV sets.

Measurements should be made in the following modes:

TVs	Monitors	Computers	Copiers	Printers
On	Operational	Operational	Operational	Operational
Standby passive	Standby	Sleep	Standby	Stand by
	Sleep			

5.6 Chemical emissions

5.6.1 Ozone

The concentration that a user is exposed to in the breathing zone should be below the Threshold Limit Values set by IEC 950 (EN 60950).

Value is to be determined in full operation of the product. Measurement in terms of mg/m³ is to be conducted according to procedures outlined in ASTM D5116/90.

5.6.2 Dust

Values should be determined for full operation of the product. Measurement in terms of mg/m³ is to be conducted according to procedures outlined for copiers in RAL-UZ 62.

5.6.3 Styrene

Measurement in terms of mg/m³ is to be conducted according to procedures outlined for copiers in RAL-UZ 62.

5.7 Materials

A declaration should be made for at least the following substances (covered by legislation and/or voluntary initiatives) that they are not present in concentrations exceeding the natural background levels:

- asbestos;
- cadmium (in plastic materials, packaging and inks);
- cadmium in CRTs;
- CFC and/or HCFC;
- chloroparaffins with chain length 10-13 C atoms, chlorination greater than 50% contained in mechanical plastic parts heavier than 25 g;
- lead contained in mechanical plastic parts heavier than 25g;
- mercury;
- PCB or PCT;
- polybrominated biphenyls, their oxides and their ethers contained in mechanical plastic parts heavier than 25 g.

The presence of the listed substances that do exceed natural background levels should be declared.

Determination of the material composition should be conducted in accordance with accepted industry practices.

5.8 Batteries

The following items should be declared:

- the type of battery (e.g. nickel-cadmium) used;
- batteries used in the product are in conformance with the EU Directive 91/157/EEC ('hazardous substances') and EU Directive 93/86/EEC ('marking requirements');
- instructional information concerning the handling of the batteries in the product including proper installation replacement and disposal is given in the product documentation

5.9 Packaging

Type and weight of packaging material(s) should be declared.

National guidelines and/or regulations apply. These may include disposal and/or recycling instructions, types of materials permitted, materials identification, etc. Local ordinances may also apply.

5.10 Documentation (user manuals)

Post-consumer recycled content and paper bleaching method should be declared.

6 Data relevant to end-of-life management

Information given in this clause is stressed as being voluntary information between a manufacturer and an end-of-life service provider.

The following data may be applicable for manufacturers which rely on public or consortium-based end-of-life management service providers. Manufacturers which provide private end-of-life management options to their customers should provide information regarding how to access these options. The data they provide their end-of-life service providers is a private arrangement between the manufacturers and the service providers.

The following data should be included in a manufacturer declaration, as far as these are relevant to the specific product categories.

6.1 Product information/description

Technical specifications regarding the product may be provided. In addition, the following information should be considered for inclusion:

- type of products;
- brand name;
- model number;
- identification/serial number, year of production or any other point of identification.

Information relating to battery disposal should be included.

6.2 Ease of disassembly

Where design features have been included to ease disassembly these may be documented. These may include:

- (exploded) view of principal structure;
- removal direction of components and parts;
- sequences for disassembly;
- materials list by component/part;
- tools, by type and where used;
- time for disassembly - total and/or by parts;
- number and types of fasteners, e.g. screws, clips, etc.;
- orientation changes, number and description.

Information regarding materials should include amount (kg) and/or percentage of total weight. Separability of material and the associated effort required to separate may be considered.

Information regarding fractions should include amount (kg) and/or percentage of total weight.

6.3 Parts that need special handling

Where materials, parts, components require special handling at end of life, these should be documented. The documentation may include:

NOTE

The content of the documentation may vary with the country where the recycling takes place.

- identification;
- location;
- weight;
- special removal and disposal instructions;
- if encapsulated or not; if so, identification of part/component/etc.;
- packaging consideration, e.g. sealed packaging;
- resistance to certain types of exposure, chemicals, e.g. resistance to acids;
- additives such as flame retardants, stabilisers and softeners;
- materials which may have transmuted in use;
- colouring information including liquid and/or powder lacquering, paint process, colour ingredients.

6.4 Reusable parts

Documentation may include:

- identification;
- location;
- special removal and refurbishing instructions;
- restrictions for re-use, if any.

6.5 Markings

A list of all plastic parts heavier than 25 grams, marked according to ISO 11469 for identification purposes in replacing, reuse, recycling or disposal, may be given.

Annex A

Declaration of product environmental attributes

This annex A contains a set templates for eco-declarations for personal computers, printers, copier equipment and television sets. These are intended as examples to help in the application of this Technical Report.

Alternative media (electronic files, electronic transfer, other) and identification technologies (bar-codes, ID units, other) may be used for automated transfer and exchange of the data in these declarations.

Annex A.1

Declaration of product environmental attributes for personal computers

Supplier's Name :

Supplier's Address:

declares, under his sole responsibility, that the product

Product Name:

Product Type:

Model Number:

Seller/Manufacturer:

Weight: kg

Dimension: cm xcm xcm

based on test results obtained from test laboratories on sample testing for above product, that it

conforms to the following laws, standards, regulations and directives:

- 89/336/EEC CE-mark (EMC-Directive)
- 91/86/EEC (Battery Directive)
- 93/157/EEC (Battery Directive)
- EN 50082-1 (EMC)
- EN 55022:1987, Class A ('radio disturbance')
- ISO 11469 (marking of plastic parts)

conforms to the following voluntary environmental program requirements

EPA Energy Star (saving electrical energy)

conforms to the environmental specifications, as listed in the ECO declaration below:

Operational data:

Energy consumption:

sleep mode:	.....	W
OFF mode:	.....	W

Physical emission:

Acoustical noise according to ISO 7779 and ISO 9296

declared sound power level		sound pressure level	
operational mode:	..... bel	operational mode	..... dB(A)
sleep mode:	..... bel	sleep mode	..... dB(A)

Materials:

The above described product does not contain:

- asbestos;
- cadmium (in plastic materials, packaging and inks);
- CFC and/or HCFC;
- chloroparaffins with chain length 10-13 C atoms, chlorination greater than 50% contained in mechanical plastic parts heavier than 25 g;
- lead contained in mechanical plastic parts heavier than 25g;
- mercury;
- PCB or PCT;
- polybrominated biphenyls, their oxides and their ethers contained in mechanical plastic parts heavier than 25 g.

in concentrations exceeding the natural background levels.

Upgradability/Extendibility:

above system is upgradable in the following manner:

- system unit
- processor
- memory
- cache
- cards
- extra slots
- spare parts are available years after end of production
- service is available years after end of production

The above system is designed for

easy assembly and disassembly, by using

-screws one type
-pop-out features
-snap-in features.

After end of life, this system can be given back to the supplier for environmental conscious recycling or disposal.

Please contact your "name of company" for take back information

Above system contains following parts, which contain regulated materials and should be disposed of in an environmental acceptable manner.

-
-
-
-

Annex A.2

Declaration of product environmental attributes for printers

Supplier's Name :

Supplier's Address:

declares, under his sole responsibility, that the product

Product Name:

Product Type:

Model Number:

Seller/Manufacturer:

Weight: kg

Dimension: cm xcm xcm

based on test results obtained from test laboratories on sample testing for above product, that it

conforms to the following laws, standards, regulations and directives:

- 89/336/EEC CE-mark (EMC-Directive)
- 91/86/EEC (Battery Directive)
- 93/157/EEC (Battery Directive)
- EN 50082-1 (EMC)
- EN 55022:1987, Class A ('radio disturbance')
- ISO 11469 (marking of plastic parts)

conforms to the following voluntary environmental program requirements

EPA Energy Star (saving electrical energy)

conforms to the environmental specifications, as listed in the ECO declaration below:

Operational data:

Energy consumption:

stand-by mode: W
 OFF mode: W

Physical emission:

Acoustical noise according to ISO 7779 and ISO 9296

declared sound power level sound pressure level
 operational mode: bel operational mode dB(A)
 which are measured in the following printing mode(s):

Chemical Emissions:

- Ozone mg/m³
- Dust mg/m³
- Styrene mg/m³

Materials:

The above described product does not contain:

- asbestos;
- cadmium (in plastic materials, packaging and inks);
- CFC and/or HCFC;
- chloroparaffins with chain length 10-13 C atoms, chlorination greater than 50% contained in mechanical plastic parts heavier than 25 g;
- lead contained in mechanical plastic parts heavier than 25g;
- mercury;
- PCB or PCT;
- polybrominated biphenyls, their oxides and their ethers contained in mechanical plastic parts heavier than 25 g.

in concentrations exceeding the natural background levels.

Batteries:

used in the printer

- type of battery (e.g. Ni-Cd, lithium ion, etc.)
- conforms to 91/157/EEC and 93/86/EEC
- information on proper handling and disposal included

Upgradability/Extendibility:

above system is upgradable in the following manner:

- upgrade possibilities (e.g. memory, fonts, etc.)
- spare parts and service period years

After end of life, this system can be given back to the supplier for environmental conscious recycling or disposal.

Please contact your "name of company" for take back information

Consumables:

- Toners and inks meet applicable EU legislation on hazardous substances
- Consumables can be returned to the manufacturer for environmentally conscious recycling or disposal
- Information on consumables return at end of life is included
- Recycled paper meeting DIN 19309 can be used in this product

Packaging:

- Packaging materials consist of: (describe and percentage by weight)
- Plastic packaging materials are marked according to ISO 11469
- Packaging recycling options such as participation in local collection and recycling consortiums are given

Above system contains following parts, which contain regulated materials and should be disposed of in an environmental acceptable manner.

.....
.....

Annex A.3

Declaration of product environmental attributes for copier equipment

Supplier's Name :

Supplier's Address:

declares, under his sole responsibility, that the product

Product Name:

Product Type:

Model Number:

Seller/Manufacturer:

Weight: kg

Dimension: cm xcm xcm

based on test results obtained from test laboratories on sample testing for above product, that it

conforms to the following laws, standards, regulations and directives:

- 89/336/EEC **CE-mark** (EMC-Directive)
- 91/86/EEC (Battery Directive)
- 93/157/EEC (Battery Directive)
- EN 50082-1 (EMC)
- EN 55022:1987, Class A ('radio disturbance')
- ISO 11469 (marking of plastic parts)

conforms to the following voluntary environmental program requirements

EPA Energy Star (saving electrical energy)

conforms to the environmental specifications, as listed in the ECO declaration below:

Operational data:

Energy consumption:

operational mode:	.....	W
stand-by mode:	.....	W
OFF mode:	.....	W

Physical emission:

Acoustical noise according to ISO 7779 and ISO 9296

declared sound power level		sound pressure level	
operational mode:	..... bel	operational mode	..... dB(A)
		stand-by mode	..... dB(A)

Chemical Emissions:

- Ozone_____ mg/m³
- Dust_____ mg/m³
- Styrene_____ mg/m³

Materials:

The above described product does not contain:

- asbestos;
- cadmium (in plastic materials, packaging and inks);
- CFC and/or HCFC;
- chloroparaffins with chain length 10-13 C atoms, chlorination greater than 50% contained in mechanical plastic parts heavier than 25 g;
- lead contained in mechanical plastic parts heavier than 25g;
- mercury;
- PCB or PCT;
- polybrominated biphenyls, their oxides and their ethers contained in mechanical plastic parts heavier than 25 g.

in concentrations exceeding the natural background levels.

The product has been manufactured without the use of class 1 Ozone depleting substances (CFC's)

Batteries:

Internal batteries do not contain any hazardous substances and will be replaced and disposed by the field engineer.

Disposal information:

After end of life, this system can be given back to the supplier for environmental conscious recycling or disposal.

Please contact your "name of company" for take back information. Plastic parts heavier than 50g are coded in accordance with ISO 11469.

Product life:

The product is developed for a product life of copies.

Spare parts and service are available for years after the product has been discontinued.

Service parts and consumables:

Does not contain any heavy metals and will be disposed of in accordance with local service support guidelines.

Toner/developer:

Has been tested and shown no mutagenic evidence.

Paper:

Runs on virgin and recycled paper (see product specifications)

Packaging:

.....
.....

Annex A.4

Declaration of product environmental attributes for television sets

Supplier's Name :

Supplier's Address:

declares, under his sole responsibility, that the product

Product Name:

Product Type:

Model Number:

Seller/Manufacturer:

Weight: kg

Dimension: cm xcm xcm

based on test results obtained from test laboratories on sample testing for above product, that it

conforms to the following laws, standards, regulations and directives:

- 89/336/EEC (EMC-Directive)
- 93/157/EEC and 91/86/EEC (Battery Directive)
- ISO 11469, parts 1-3 (marking of plastic parts)

conforms to the following environmental specifications, as listed below:

.....

conforms to the environmental specifications, as listed in the ECO declaration below:

Operational data:

Energy consumption:

stand-by passive mode	.....	W
off mode:	.....	W

Upgradability/Extendibility:

The product life-span can be extended by upgradable software. The product life span can be extended by easy access to electronic and electric parts for repair and exchange. Primary / secondary batteries in the remote control can be easily exchanged.

Physical emissions:

Acoustical noise according to ISO 3741 and ISO 3742

sound power level (generated by appliance)		sound pressure level (at operator position)
in stand by mode: bel		..... dB(A)

Materials:

The above described product does not contain:

- asbestos;
- cadmium (in plastic materials, packaging and inks);
- CFC and/or HCFC;
- chloroparaffins with chain length 10-13 C atoms, chlorination greater than 50% contained in mechanical plastic parts heavier than 25 g;
- lead contained in mechanical plastic parts heavier than 25g;
- mercury;
- PCB or PCT;
- polybrominated biphenyls, their oxides and their ethers contained in mechanical plastic parts heavier than 25 g.

in concentrations exceeding the natural background levels.

Battery:

Type: rechargeable Li-Ion battery, labelled according to EU directive 93/86/EEC

Information on proper handling and disposal included in the user manual.

Packaging:

Number of packaging materials: types

The 3 types and their weights:

- carton boxkg
- white expanded polystyrene foam (EPS)kg
- protection bag (polyethylene, PE)kg
- handles (polypropylene, PP)kg

Recycling instruction: manufacturer/dealer takes all packaging materials back for reuse and recycling

**Annex B
Items under discussion**

Accepted measuring methods or procedures for the attributes listed in this annex are not available. In other cases, threshold limits or interpretation of results are insufficiently defined or consensus is lacking.

However, the environmental relevance of these attributes is recognized. More study and discussion is required to reach agreement.

B.1 Heat emissions

Heat emission values in operation mode are recommended.

Measurements should be expressed in kJoules.

B.2 Volatile Organic Compounds (VOC)

The "Guideline for Characterization of VOCs" (emitted from Indoor Materials and Products using Small Test Chambers) should be considered.

These guidelines can be used, in principle, for VOC emission measurements of all electrical devices such as computers, printers, etc., however no agreement exists on threshold and limit values.

Annex C Bibliography

This annex lists documents that are of interest for the users of this Technical Report.

C.1 ECMA

Standards

ECMA-160	Determination of sound power levels of computer and business equipment using sound intensity measurements; scanning method in controlled rooms
ECMA-172	Procedure for the measurement of emissions of electric and magnetic fields from VDUs from 5 Hz to 400 kHz

Technical Reports

ECMA TR/27	Methods for the prediction of installation noise levels
ECMA TR/62	Product noise emission of computer and business equipment

C.2 ISO Standards and DISs

ISO 7708:1995	Air quality - particle size fraction definitions for health related sampling
ISO 7779:1988	Acoustics - Measurement of airborne noise emitted by computers and business equipment
ISO/IEC 11159:1996	Office equipment - Minimum information to be included in specifications sheets - Copying machines
ISO/IEC 11160	Office equipment - Minimum information to be included in specifications sheets - Printers - Part1 and Part2
ISO 14001:1996	Environmental management systems - Specifications with guidance for use
ISO/DIS 14004:1996	Environmental management systems - General guidelines on principles, systems and supporting techniques
ISO/DIS 14010:1996	Guidelines for environmental auditing - General principles
ISO/DIS 14011:1996	Guidelines for environmental auditing - Audit procedures - Auditing of environmental management systems
ISO/DIS 14012:1996	Guidelines for environmental auditing - Qualification criteria for environmental auditors

C.3 IEC Standards

IEC Guide 109	Environmental aspects - Inclusion in electrotechnical product standards
IEC 950:1991	Safety of information technology equipment including electrical business equipment

C.4 European Union (EU)

VDI Berichte Nr. 1122, 1994	The European collaboration action indoor air quality and its impact on man: scope, purpose, implementation, results and ongoing activities
89/391/EEC	Council directive on the minimum Health & Safety requirements regarding the exposure of workers to the risk arising from physical agents
EUR 13 593	Environment and quality of life: Guideline for the characterization of volatile organic compounds emitted from indoor materials and products using small test chambers

C.5 Germany

RAL-UZ 78	July 1994 and March 1996: Basic criteria for the award of the environmental label - Environmentally acceptable workstation computers
ZVEI	Substances contained in products of the electrical/ electronic industry, Germany, 1995.

C.6 Sweden

SITO, May 16, 1995	Product declaration for computers
SITO, March 1996	Eco Declaration - Copiers
SITO, May 16, 1995	Product declaration - Monitors

SITO, May 16, 1995	Product declaration - Copiers
SITO, May 16, 1995	Product declaration - Fax Machines
SITO, May 16, 1995	Product declaration - Toner
SITO, May 16, 1995	Product declaration - Ink cartridges
SITO, May 16, 1995	Product declaration - Printers
TCO '95	Test methods for environmental. labelling of computer systems, 2nd edition May 22, 1995

C.7 Swiss Federal Office of Energy

E2000	Ordinance on Energy Use 1996
730.01	Ordinance on Energy Use, 22 January 1992, Appendix 7 - 13
730.011.1	Ordinance on energetical testing procedures for telefax machines, 18 May 1994
730.011.2	Ordinance on energetical testing procedures for Copiers with Electrostatic Copying Processes for Normal Paper, 29 August 1994
730.011.5	Ordinance on energetical testing procedures for printers, 29 August 1994
730.011.5	Ordinance on energetical testing procedures for home video recorders, 29 August 1994
730.017.1	Ordinance on energetical testing procedures for mains operated television sets, 29 August 1994

C.8 United States Environmental Protection Agency (US EPA)

Energy Star Program	Memorandum of understanding for: computer, monitor, printer, fax
EPA/600/4-84/041	Compendium of methods for the determination of toxic organic compounds in ambient air

C.9 Perkin-Elmer

No. 33	Thermal Desorption applications: Overview of sample strategies for organic pollutants in ambient air
No. 34	Field preparation and stabilization of volatile organic constituents
No. 35	On-line air analysis for volatile organic precursors
No. 36	Sample and analysis of Polychlorinated Biphenyls (PBC's)
No. 37	Sampling and analysis of atmospheric monoterpenes
No. 39	US EPA Monitoring Method TO-14

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