Environmentally Compatible Products
Part 1: Product Development Guidelines
Foreword
This standard has been drawn up by the "Umweltverträgliche Produktgestaltung und Bewertung" (Environmentally compatible product design and assessment) Team of the Innovation and Technology Committee’s (AIT) "Environmental protection and industrial safety" Working Group.

Changes
The contents have been reformulated compared with the previous edition of June 1997. Possible solutions and examples illustrating implementation of the guidelines may be found in the newly issued guide “Environmentally Compatible Products - Solutions and Examples on the Siemens Standard SN 36350”.

Earlier editions
SN 36350 : 1993-03
SN 36350-1 : 1994-09, 1996-12 ; 1997-06

1 Purpose and area of application

1.1 Purpose
This standard describes guidelines for the design of environmentally compatible products, and their integration into the product planning and development process. The purpose is to achieve optimum environmental compatibility of products, taking account of all phases of the product lifecycle, as well as economic and technical aspects.


1.2 Area of application
The present standard is to be employed in the planning and development of products (hardware, software, services) within the SIEMENS company.

1.3 Terms / definitions
The German version of this standard makes use of terms and definitions from the Guidelines VDI 2243 Part 1 "Konstruieren recyclinggerechter technischer Produkte; Grundlagen und Gestaltungsregeln”.

2 Standardization references
This standard contains stipulations from other publications in the form of dated or undated references. These standardization references are quoted at the relevant places in the text, and the publications are listed below. In the case of dated references, subsequent amendments or revisions to these publications only belong to this standard if incorporated by way of amendment or revision. In the case of undated references, the last edition of the publication referred to shall be definitive.

DIN ISO 11469 Generic identification and marking of plastic products
IEC Guide 109 Environmental Aspects - Inclusion in Electrotechnical Product Standards
ISO 14001 Environmental Management Systems - Specification
ISO 14040 Life Cycle Assessment - General Principles and Practices
SN 36350-2 Environmentally Compatible Products; Hazardous substances, list of prohibited substances, list of substances to be avoided
SN 36350-3 Environmentally Compatible Products; Polymers, assessment of suitability for recycling and miscibility of thermoplastic polymers
SN 36350-4 Environmentally Compatible Products; Metallic materials, classification of recycling properties and miscibility
SN 36350-5 Environmentally Compatible Products; Ecological requirements for packaging
SN 36351 Rules for the marketing of dangerous substances in products
VDI 2243 Part 1 Konstruieren recyclinggerechter technischer Produkte; Grundlagen und Gestaltungsregeln (Construction of recyclable technical products, principles and design rules). In German only.
3 General

3.1 Principles of environmentally compatible product design
The smaller the total environmental burden stemming from a product throughout its entire life cycle, the greater its environmental compatibility.

The principles of environmentally compatible product design are
- to take the product’s entire life cycle into account,
- examination of all categories of possible environmental impacts, plus
- simultaneous consideration of the ecological, technical and economic aspects from the start of the product design process.

In individual terms, the objectives of environmentally compatible product design are the avoidance of harm to the environment or to health caused by hazardous materials, the conservation of raw materials and energy and the avoidance of waste.

3.2 Guidelines on environmentally compatible product design
The following overview provides guidelines on environmentally compatible product design. Notes on how to put these guidelines into practice are included in the guide “Environmentally Compatible Products – Solutions and Examples on the Siemens Standard SN 36350”, which is oriented towards this list.

Marketing, planning and development aspects
1. Assessing environmental effects over the entire product life cycle and deriving development targets from this information.
2. Determining and taking account of environmentally-related customer requirements.
3. Determining the environmentally-related performance features with which competitive advantages may be achieved.
4. Developing a concept for the end of life treatment of the product (reuse, recycling, disposal), with estimated costs.

Procurement and manufacturing aspects
5. Minimizing the amount of materials used.
6. Minimizing production waste by means of appropriate product design.
7. Minimizing product weight.
8. Minimizing the variety of materials used.
9. Minimizing the number and variety of product parts (components).
10. Taking account of environmental aspects in the selection and procurement of semi-finished products, components and OEM products.
11. Complying with legal bans and restrictions as well as with the avoidance list (SN 36350-2) in the selection of materials and components.
12. Employing recycled plastics where possible.
13. Avoiding the use of hazardous materials in the manufacturing of products.
14. Minimizing energy consumption in manufacture.
15. Obtaining information on the environmentally relevant properties of the semi-finished products, components and OEM products, for example on the proportion of materials as per SN 36350-2.
16. Minimizing the amount of packaging (weight, volume).
17. Optimizing the environmental compatibility of the packaging in relation to the selection of material and logistics considerations (SN 36350-5).

Sales and service aspects
18. Informing customers about the environmentally compatible disposal of packaging.
19. Designing customer documentation in accordance with environmental compatibility.

Product usage aspects
20. Designing products to have a long useful life.
22. Minimizing energy consumption in idle status or during operation.
23. Minimizing consumption of operating materials.
24. Excluding the possibility of harm to the environment or health caused by the materials used or by noise.
25. Drawing attention to operating methods that conserve resources (energy, water, etc.).
26. Drawing attention to the environmentally compatible disposal of consumables (batteries, toner, etc.).
27. Drawing attention to the environmentally compatible disposal of the product at the end of its useful life.

**Disassembly and disposal**

28. Drawing up disassembly and disposal instructions to include details on the type and distribution of materials in accordance with SN 36350-2.
29. Designing product components containing materials cited in SN 36350-2 in such a way that they can be removed easily and without their destruction.
30. Minimizing the number and variety of connections.
31. Designing all connections in such a way that they can be dismantled easily and non-destructively.
32. Designing all connections that require dismantling to be readily identifiable and easily accessible.
33. Minimizing the number of steps necessary for disassembly.
34. Enabling disassembly using a small number of standard tools and with few changes of position.
35. Enabling the reuse or further use of products or components, for example through standardization.
36. Employing recyclable materials.
37. Marking plastic components suitable for recycling.
38. Taking account of compatibility between materials with respect to recycling (SN 36350-3,4).
39. Avoiding non-recyclable composites and coatings.
40. Using company logos and labels made from the same material as the body of the products or a compatible material.

### 3.3 Integration into product planning and development

The environmental compatibility of products is to be tracked throughout the product development process, along with their ability to perform the technical function concerned and their economic viability. All those groups involved in the development of the product, such as procurement, manufacturing, sales and, where appropriate customers, are to be involved.

A major proportion of the product properties, the manufacturing costs and the environmental impact are determined during the initial phases of the product development process. It is thus important to take account of environmental compatibility aspects right from the earliest phases.

The objectives and main points of focus of environmentally compatible product design are to be laid down during the product strategy and product profile planning phases on the basis of the product evaluation process. The objectives and points of focus are set down in the requirement specification.

Concepts for achieving environmental objectives are set down during the product concept planning, thereby stipulating the environmental product features. The concepts and attributes are incorporated into the performance specification.

Fixed points within the product evolution process are to be identified for target/actual comparison.

The concepts are put into increasingly detailed concrete form during the remaining phases of the product realization. Decision-making tools such as checklists and material preference lists are employed here.

The product features achieved as a result of environmentally compatible product design are to be documented.

Experiences from the subsequent manufacturing, sales, product usage, maintenance and disposal phases should be gathered and evaluated in order to improve the process of environmentally compatible product design.

The figure below shows the phases of the product lifecycle, together with the associated activities related to environmentally compatible product design.
Fig. 1: Activities related to environmentally compatible product design over the phases of the product lifetime

- **Marketing**
  - Determine environment-related customer requirements and observe activities of competitors
  - Determine environmental effects and establish targets
  - Stipulate environmental requirements
  - Develop concepts designed to meet environmentally-related requirements and disposal concept
  - Stipulate and use tools for environmentally compatible product design
  - Detail optimization with aid of tools

- **Planning**
  - Deploy procedure for environmentally compatible procurement

- **Development**
  - Use of environmentally compatible manufacturing procedures (industrial environmental protection)

- **Procurement**
  - Documentation of environmentally relevant features
  - Disassembly/disposal instructions

- **Manufacture**
  - Assessment with a view to subsequent improvement; Ensuring experience flows back into planning and development

- **Sales Service**

- **Use**

- **Disassembly Disposal**

**Activities related to environmentally compatible product design**