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Preparation of information for use (instructions for use) of products —

Part 2:
Assembly of self-assembly products

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialised system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO/IEC documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by ISO/IEC Joint Working Group 16, Maintenance of IEC 82079 series, which is linked to ISO/TC 10/SC 1, Basic Conventions, and IEC TC 3, Documentation, graphical symbols and representations of technical information, in cooperation with the Systems and Software Engineering Standards Committee of the IEEE Computer Society.

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Introduction

This document provides requirements and recommendations for preparing instructions for self-assembly of products by non-skilled persons that are adapted to their expected knowledge and abilities. The goal is to enable them to avoid misunderstandings, errors, or injury, and end up with correctly constructed, undamaged products. (An added benefit is that product suppliers can avoid complaints from frustrated, dissatisfied customers.)

Compared to audiences sharing a common profession or employer, levels of ability within non-skilled and consumer audiences are likely to vary more widely relevant to the tasks of assembling a product. In a self-assembly situation, the safety of the assembler and of subsequent users of the assembled product depends on:

— Presenting each assembly step in a way that is understandable by the assemblers;

— Identifying and reducing the potential for ambiguity, misunderstanding, or human error in assembly through such means as risk assessment and usability testing of the instructions by a panel of assemblers representative of the target audience;

— Including information on how assemblers can check that what they have assembled functions safely and correctly.

This document supplements the general requirements applied to information for use of products (including instructions for self-assembly) as laid down in IEC/IEEE 82079-1:2019.

The requirements and recommendations in this document can help reduce the risk of assemblers (particularly consumers) making safety-critical errors. Instructions prepared taking the tendencies of typical non-skilled assemblers into account are likely to be more effective and easier to follow for all assemblers.

The presentational techniques recommended are expected to reduce errors of both typical consumers and more technically experienced assemblers. They are based on published reports of controlled tests and commonly accepted as good practice in this field.

Employing these techniques can help assemblers to avoid the problems commonly experienced with poor instructions for self-assembly, but cannot compensate for product designs that are too complex (or too demanding of craft skills) for the target audience. Moreover, where errors in assembly could cause serious harm, even the most comprehensive instructions cannot completely substitute for a professional assembler's technical experience in anticipating, perceiving, and controlling risks.

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Preparation of information for use (instructions for use) of products —

Part 2: Assembly of self-assembly products

1 Scope

This document applies to the preparation of instructions for assembly of self-assembly products. It provides requirements and recommendations for the presentation of instructions to a non-skilled target audience assembling a product without help from a trainer or supervisor. These requirements and recommendations are additional to those in IEC/IEEE 82079-1, which applies to the preparation of information for use of products during phases such as operation and maintenance - as well as assembly.

Instructions for assembly of self-assembly products covers:

— Instructions that are provided to support a product that is supplied as a kit of components designed to be assembled into a specific item (which can have alternative assembly configurations). These are often described as “flatpack products.”

— Instructions for installing products supplied with components (e.g. screws) intended for attachment to existing products (e.g. a vehicle) or fixtures (e.g. a wall).

— Instructions for erecting or configuring products that incorporate structural elements requiring folding, locking, or tensioning (e.g. child pushchairs or camping equipment).

— Instructions intended to support the assembly of a specific product intended to be assembled by a non-skilled assembler for their own use - or for use by some other individual (e.g. assembly of a toy by a parent for subsequent use by a child).

The document applies to instructions for all self-assembly products intended to be assembled by non-skilled persons. A skilled person here means an individual who – through relevant technical education, training or experience is able to perceive risks and avoid hazards in the assembly and use of a particular product. In contrast, non-skilled persons performing product assembly without supervision or product-specific training rely solely on the information for use (including assembly instructions) provided for the safety of the assembly task and of the assembled product. In addition to consumers, persons considered non-skilled can therefore include independent installers of appliances and assemblers of furniture..

However, information for use (assembly instructions) cannot compensate for product designs that are too complex (or too demanding of craft skills) for the intended target audience.

This document does not apply to:

— Components or constructional material supplied in combinations and numbers specified by the customer;

— Multiple identical kits supplied in batches for professional assembly and commercial sale as an assembled product;

— Products intended for professional assembly only by someone skilled or trained in assembling such products e.g. an electrician or a vehicle mechanic.

This document is intended for use by all parties involved in the preparation of instructions for self-assembly, including the following: product manufacturers and suppliers, hardware and software product and

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information designers, technical communicators, technical illustrators, testers and evaluators, managers, and safety authorities.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC/IEEE 82079-1:2019, *Preparation of information for use (instructions for use) of products – Part 1: Principles and general requirements*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the definitions in IEC/IEEE 82079-1:2019 apply, together with the following.

ISO, IEC, and IEEE maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https:// www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

— IEEE Standards Dictionary Online: available at: https://dictionary.ieee.org

3.1.1
assembler
person who assembles a self-assembly product

Note 1 to entry: The assembler is not necessarily the person who uses the assembled product.

Note 2 to entry: Assemblers as a group are the target audience for whom the instructions for self-assembly are intended by the supplier [In line with definition of target audience in IEC/IEEE 82079-1:2019].

3.1.2
assembly
<process> process of putting together components to make a complete product

Note 1 to entry: Assembly in this document refers mainly to self-assembly of product kits, which can include factory-produced sub-assemblies or separate components.

Note 2 to entry: The assembly as a process can involve attachment to other products or fixtures (e.g. a wall) or installing connections to energy or water systems.

3.1.3
assembly
<structure> two or more components of a product kit attached together part way through *assembly* (3.1.2), before the product is completely assembled

3.1.4
assembly illustration
picture or other graphic that shows the components involved and action to be performed by an *assembler* (3.1.1) in one step during an *assembly* (3.1.2)

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3.1.5
callout
projecting or arrow-like artistic device to call the attention of the viewer out of the main body of the illustration towards important information.

EXAMPLE A cartoon-like speech bubble, typically containing a short text message or subsidiary illustration concerning the area within the main illustration to which the arrow points.

3.1.6
cross-sectional view
imagined 2-dimensional view of a product as if part of it had been cut away to show the internal arrangement of components

3.1.7
cutaway view
imagined 3-dimesnional view of a product as if part of it had been cut away to show the internal arrangement of components

3.1.8
exploded view
drawing of an *assembly* (3.1.3) in pictorial representation in which all the components are drawn to the same scale and correctly orientated relative to each other, but are separated from each other in their correct sequence along common axes

[SOURCE: ISO 10209:2022]

3.1.9
ghosting
artistic effect depicting some components, surfaces or features less densely to focus attention on one feature or to show components internally.

EXAMPLE Thinner or broken lines used to give surface features a semi-transparent or ‘ghostly’ appearance.

3.1.10
information for use
instructions for use
information provided by the supplier that provides the target audience with concepts, procedures, and reference material for the safe, effective, and efficient use of a supported product during its life cycle

EXAMPLE Step-by-step instructions, troubleshooting information, and assembly (3.1.2) instructions.

Note 1 to entry: "Instructions for use, procedures for the safe, effective, and efficient use of a supported product", was the term formerly used to include all the content defined as part of information for use.

Note 2 to entry: Excludes supplementary information, which is outside the scope of information for use.

3.1.11
isometric representation
projection method in which each of the three coordinate axes is inclined at the same angle to the projection plane

[SOURCE: ISO 10209:2022, 3.2.26]

3.1.12
non-skilled assembler
assembler (3.1.1) having insufficient relevant technical education, training, or experience of a supported product to perceive risks during *assembly* (3.1.2) or use of a product and to avoid hazardous mis-assembly, without the information provided by the instructions for self-assembly

3.1.13
safety-critical (instruction) step
step in a set of instructions in which a foreseeable error that an assembler might make which could result in harm to the assembler or user

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3.1.14
self-assembly product
flatpack product
ready-to-assemble product
product that is intended to be assembled or erected from separate components without the help of a supervisor or trainer and relying only on step-by-step instructions

EXAMPLE 1 Kit of components.

EXAMPLE 2 Product incorporating structural elements requiring folding, locking, or tensioning (such as child pushchairs or camping equipment).

3.1.15
stack
components that need to be assembled one after another along a common axis or one on top of another

EXAMPLE Wheels along an axle, nuts and washers onto a bolt.

3.1.16
strip frame
sequence of framed illustrations in a framed row or column, after the manner of a cartoon strip

3.1.17
sub-assembly
assembly (3.1.3) that is connected to other components or sub-assemblies to form a larger sub-assembly or the completed product

Note 1 to entry: In a self-assembly process sub-assemblies will typically be constructed separately by the assembler one at a time, and then brought together.

3.2 Abbreviated terms

CAD computer aided design

PPE personal protective equipment

4 Fulfilment of requirements

A claim of conformance to this document for information supporting a particular self-assembly product shall be made only if all of the normative requirements (i.e. “shall statements) in this document have been fulfilled. A claim of conformance shall be supported by documentation recording the required evaluation of the instructions for self-assembly by:

a) an empirical effectiveness check of all the instructions for self-assembly, conducted according to the requirements in Clause 9 and involving persons representing the target audience;

b) evaluation of safety-critical instruction steps;

c) by risk assessment (see 5.2) by usability panel testing according to the requirements in Clause 9.

Nothing in this document exempts self-assembly products from the requirements in IEC/IEEE 82079-1, which apply to information for use in general including an assembly phase.

Additionally, for consumer self-assembly products, a claim of conformance to this document shall only be made if the information for use of the product fulfils the requirements applying to consumer products in IEC/IEEE 82079-1:2019, 4.1, 4.2, and 4.3.

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5 Principles

5.1 Provision of instructions for self-assembly as part of the supported product

Information for use is an integral part of the supported product. Preparing instructions for self-assembly shall therefore receive the same attention and importance as would apply to the alternative of completely assembling a product before supply to users.

Instructions for self-assembly steps shall be presented in the form of a one-step-at-a-time sequence of framed assembly illustrations (see 3.1.4 and 7.2). Text instructions shall be viewable adjacent to the frame they concern whenever necessary for clarification or to convey safety precautions (see 6.6).

Assembly illustrations - accompanied by text instructions when necessary - shall enable the non-skilled assembler to construct (safely) an assembled product that is safe and effective for the intended users, for example by:

a) distinguishing between similar components;

b) identifying joining points ;

c) conveying actions an assembler needs to perform to attach components;

d) showing when and how the assembler needs to support components during assembly;

e) showing when and how the assembler needs to confirm adequate strength of attachments and fitness for purpose of the completed product.

Self-assembly products shall be supported by instructions for self-assembly as needed throughout all relevant phases of the product life cycle. For example, if the supplier intends the product to be dis-assembled for transport, storage, maintenance, or safe disposal, then instructions for disassembly without damage shall also be provided.

5.2 Minimizing risk through product design and instructions for self-assembly

Instructions for self-assembly shall address and reduce residual risks to assemblers and users during assembly or arising from incorrect assembly.

Examples of self-assembly products that can be hazardous due to risks in assembly include:

— products intended to support or withstand the load of a person, heavy object, or environmental force such as wind or water;

— products intended to prevent instability of heavy objects;

— powered or manual machines, appliances, or tools;

— products with a safety protective function, such as restricting access by children or restraining animals;

— medical devices;

— personal care aids;

— products intended to dispense or contain substances potentially hazardous due to their thermal, chemical, or electrical properties.

The risks of product self-assembly and use can be reduced through product design, design of the assembly procedure, design of the instructions for assembly, and by testing of those procedures and instructions. However, assembly instructions cannot compensate for designs of product or assembly procedure that are too complex or too demanding of craft skills for the intended target audience.

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