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ISO 20607:2019

Margaretha Hopman explains in detail the ISO 20607:2019 Safety of machinery — Instruction handbook — General drafting principles standard.

In 1989, the first version of the Machinery Directive (Directive 2006/42/EC[1], the 'MD') became effective. From then on, manufacturers had to be able to demonstrate compliance with the essential requirements of the MD for any piece of machinery marketed in the European Union. One of these essential requirements concerns instructions for use; these must be supplied with every machine.

Manufacturers have complained from the start that the MD does not provide enough guidance concerning instructions for use. That is where ISO 20607 comes in: It was written specifically to help and guide manufacturers on this point.

Read on, and you will see that ISO 20607 can also be a great help to you as a technical author. I know it has helped me in the discussions I had with clients about writing user-centred instructions.

See the inset for MD basics on page 41 if you are new to this field. First, let's take a quick look at what the MD says about instructions for use.

Instructions for use (MD)

Instructions for use are an essential part for safe use or operation of machinery, according to the MD. That implicitly means that the machine is finished only when the instructions for use are finished. The MD does not tell manufacturers exactly how they are to meet the essential requirements concerning instructions for use, but there are references to topics that should be addressed. For example, the instructions must describe:

- Residual risks, and how to contain these risks
- The intended use of the machinery, but also any reasonably foreseeable misuse
- Safe use of the machinery.

In addition, the instructions must be provided in a form that is unambiguous and easily understood; it must not be excessive to the extent of overloading the operator. If the machinery is intended for use by non-professional operators, the wording and layout of the instructions must take into account the level of general education and acumen that can reasonably be expected from such operators.

Then there is the 'language requirement': instructions must be available in one or more official EU community languages. Most manufacturers are not happy about this, because it means extra costs for translations. The fact that the MD expects manufacturers to supply all instructions on paper means more expense.

An experienced technical author will probably know how to interpret the MD and will know what to include in instructions for use, but manufacturers have been waiting for years for the more specific guidance given in ISO 20607.

1. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02006L0042-20190726 (accessed 17 November 2020). The official text of Directive 2006/42/EC.

Instruction handbook (ISO 20607)

The title of this new standard implies that it is about instruction handbooks (compared to instructions for use in the MD). ISO 20607 defines an instruction handbook as 'part of the information for use provided by a machine manufacturer to the machine user that contains instructions and advice concerning the use of the machinery during all phases of its life cycle'[2].

This does not mean that manufacturers are allowed to create instruction handbooks only from now on, nor that all information should be contained in one document. In fact, the standard advises manufacturers to create one document for each targeted user group, each with its own part number or each with its own title (installation manual, user manual, maintenance manual etc.).

Apart from helping manufacturers (and technical authors) in writing an instruction handbook, the purpose of ISO 20607 is to:

- Improve the safety specifications and readability, and ease of use of the instruction handbook of the machine
- Specify requirements for the machine manufacturer for preparation of the safety relevant parts of an instruction handbook.

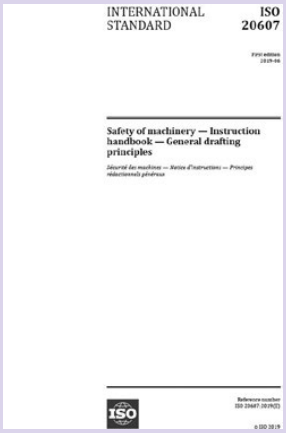
Though readability and usability of instructions for use are requirements that are implied by the MD, they become much more concrete in ISO 20607. The same applies to requirements concerning operator safety and general machine safety.

I was thrilled when I first read this standard, because it describes exactly the way we technical authors wish to do our job. What else is interesting about this standard?

Good to know about ISO 20607

ISO 20607 is classified as a Type-B standard. That means it is a generic safety standard[3].

As of April 2020, ISO 20607 is on the list of harmonised standards for the MD. That means that compliance with the normative clauses of ISO 20607 confers a *presumption of conformity* with the corresponding essential requirements of Directive 2006/42/EC[4].


INTERNATIONAL STANDARD
ISO 20607
Safety of machinery — Instruction handbook — General drafting principles

2. Instruction handbook is a subset of information for use. For more information, refer to ISO 12100:2010, 6.4.

3. Reference: ISO 12100:2010 "Safety of machinery – General principles for design – Risk assessment and risk reduction"; specifies basic terminology, principles and a methodology for achieving safety in the design of machinery.

4. List of harmonised standards https://eur-lex.europa.eu/eli/dec_impl/2020/480/oj (accessed 5 November 2020).

ISO 20607 in summary

Clauses 1 - 3 of the standard describe the usual: scope, normative reference, terms and definitions; these clauses are interesting to read, but I will not discuss them in detail in this article.

Clause 4 (Principles and general information) is where things get interesting. It offers very specific guidance for the preparatory work that a manufacturer (or a technical author) should undertake before creating the instruction handbook. For instance, a manufacturer should:

- Identify target groups/persons who interact directly with the machine and consider any specific needs, previous knowledge and educational background. Examples of target groups given are installers (system integrators), operators, maintenance personnel or technicians, cleaning personnel, dismantling personnel.
- Provide instructions for use that cover the complete life cycle of the machine
- Create a clear structure
- Identify tasks that the target groups shall perform and determine information needs per target group, and consider creating a separate document for each target group
- Use comprehensible and consistent language (short and simple sentences, logical and sequential writing, active voice etc) that is easy to translate
- Describe residual risks, and make sure that warnings and hazards stand out
- Provide information concerning IT security vulnerabilities (see ISO/TR 22100-4:2018, 10.4).

Clause 5 (Content and structure of the instruction handbook) consists of an extensive list of items to consider for including in an instruction handbook. See Figure 1 for an excerpt of the clause on fault finding/ troubleshooting and repair.

In my experience, this is exactly the type of guidance many machinery manufacturers are looking for. The standard does emphasise that the list is an example, and that manufacturers must determine which items are relevant for the type of machinery they build.

5.2.11 Fault finding/troubleshooting and repair

The instruction handbook shall include instructions and information for general fault finding/ troubleshooting and repair, such as:

— fault identification and location for repair;

— troubleshooting; and

— procedures to repair the machine and restore operation.

The fault list should be based on certain logic. For example, first faults that are easy to resolve, or the most common faults first, see Table 2.

Table 2 — Fault list example

Fault message	Fault	Possible cause or procedure for detecting the fault	Solution	Performed by (unskilled/skilled/ certified)
...	...	...	...	...
...	...	...	...	...

Where necessary, add special notes about faults, precautionary measures and safety instructions.

Figure 1. ISO 20607, clause 5.2.11

Clause 6 (Language and formulation/style guide) offers advice on language and formulation in the form of a very short style guide. Here, the MD language requirement gets a new twist: the standard advises the manufacturer to agree with the customer on the language(s) used in the instruction handbook. That makes perfect sense because many large industrial machines are one of a kind. Clause 6 also provides more guidance on how to handle residual risk information, and on how to present warnings and hazards. The basic rule of thumb given is to:

- Use a signal word, for example DANGER, WARNING and CAUTION
- Add a description of the nature or type of hazard
- Describe the possible injury or damage, and how such injury or damage can be avoided.

Clause 7 (Forms of publication) is interesting too. ISO 20607 advises manufacturers to publish instruction handbook(s) in one or more ways. Apart from paper, forms of publications suggested in ISO 20607 are electronic storage mediums, visual and/or auditory forms that are internet-based, on an external server, a website or other storage location. Information in whatever form is allowed, provided that:

- It is available with the machine at the time of commissioning
- It is in the form agreed with the customer
- It is in the language(s) agreed with the customer
- It is in agreement with legal requirements of the country in which the machine is placed on the market and/or put into service for the first time.

The last bullet point means that manufacturers will still have to supply paper documentation if they must comply with the MD.

Annex A describes the correspondence between ISO 12100:2010 Safety of machinery — General principles for design — Risk assessment and risk reduction (6.4) and ISO 20607. Every machinery manufacturer should be aware of the content of ISO 12100:2010 already.

Annex B gives recommendations for presentation and formatting. This is identical to the information given in another interesting standard for technical authors: IEC/IEEE 82079-1:2019. See Figure 2 for an excerpt.

Annex B also offers recommendations for emphasising information, use of headings, and use of colours.

Product/ information document size	Location and role of instruction	High contrast dark text on light background	Low contrast colours or white on	Complex character sets (e.g. Kanji)	Other remarks	Safety signs and graphical symbols	
						Symbols generally	Safety signs
Instructions viewed from up to 1 m distance on floor-standing products	critical on product markings	14 pt bold BE68.3 1,0QGO aeocld	16 pt bold BE68.3 1,0QGO aeocld	—	Consider using large print fonts specially developed to help people with visual impairments to read signs and labels at 30 cm to 100 cm	As applicable. Otherwise according to viewing distance from which attention needs to be attracted or the symbol needs to be recognized. Less than 15 mm height unlikely to be sufficient for critical on-product markings	
	text	14 pt	16 pt	—			
Instructions on desk-top products, information in printed manuals or single-fold leaflets and documents intended for printing by user	critical on product markings	14 pt bold BE68.3 1,0QGO aeocld	16 pt bold BE68.3 1,0QGO aeocld	—			
	headings	12 pt BE68.3 1,0QGO aeocld	14 pt BE68.3 1,0QGO aeocld	—	Serif fonts may be used (but sans-serif preferred)	5 mm minimum height (or 14 pt) e.g. ☺	10 mm minimum height e.g. ⃠

Figure 2. Excerpt Table B.1 - Minimum recommended text font sizes and heights of safety signs and graphical symbols according to IEC/IEEE 82079-1:2019, Table 4

Table C.2 — Sentences

Recommendation	Not preferred	Preferred
One topic per sentence.	The assembly consists of two side panels and two connecting plates which are attached with a hinge to each other and are bolted to the main panel.	The assembly consists of two side panels and two connecting plates. These panels are attached to each other with a hinge. The connecting plates are attached to the main panel with four screws.
Use nouns instead of pronouns.	It may protrude maximum 15 cm.	The load may protrude maximum 15 cm.
Omit no verbs.	Thermostat to 90 °C.	Set the thermostat to 90 °C.
Use bullets when the order is unimportant.	The control panel contains an on/off switch, a start button and a stop button.	The control panel contains the following buttons: — an on/off switch — a start button — a stop button
Use a list with letters or numbers when the order is important.	Remove the label as the carriage is retracted and open the isolation valves, then push the carriage slowly out (taking care that the other parts are not touched!), and then close the valves.	a) Pull the carriage in. b) Remove the label. c) Open the isolation valves. d) Push the carriage slowly and ensure it does not touch other parts. e) Close the isolation valves.

Figure 3. ISO 20607, Table C.2

Annex C contains recommendations for writing instructions, with examples. Apart from recommendations for drafting general instructions, there are recommendations for writing clear sentences (see Figure 3), for use of words, for use of verbs, and for writing in general. Even though it is good to have these examples, I have mixed feelings about this Annex. A professional technical author should already know about these things. For a non-professional author (for example, an engineer writing the instruction handbook), this Annex may not provide enough guidance.

The **Bibliography** lists several standards on the topic of graphical symbols, safety of machinery and another reference to IEC/IEEE 82079-1:2019 Preparation of information for use (instructions for use) of products – Part 1: Principles and general requirements.

How can ISO 20607 help you?

First, the standard will help in creating awareness among manufacturers about the need for more complete and more user-centred documentation. That will help you as a technical author to do your job.

Then there is Clause 5; it can be easily converted into a checklist that will help determine what information each user type needs. In fact, I have created such a checklist already and I have used it to get started in various projects with different clients. My clients add the completed checklists to their technical files, to document the presumption of conformity to the MD concerning instructions for use.

In the past, I have had to deal with clients who wanted to document the bare minimum in instructions for use. Now the standard helps me in convincing my clients that they need to prepare more elaborate instructions, often in more than one form, to more efficiently meet the needs of identified user groups.

The fact that the instruction handbook should cover the complete life cycle of the machine was an MD requirement already, but one that most manufacturers conveniently used to forget in the past. This standard will force manufacturers to think about, and document, for example scrapping procedures before they have even started producing the machine. From now on, adherence to ISO 20607 should result in a more complete set of instructions with every machine, and hopefully also in instructions that are better targeted at specific user groups.

Conclusion

ISO 20607 offers a wealth of information and guidance in only 24 pages. The standard will help and guide manufacturers (and technical authors) in making sure that the right information arrives at the machine user at the right time, in a form that best suits user needs.

The writers of this standard have clearly tried to include guidance concerning some of the newer publication technologies and IT issues, but have not been able to provide very clear guidance just yet. For that reason, I expect that the standard will be updated after the updated MD is published.

What you should know about the Machinery Directive

The Machinery Directive (official name Directive 2006/42/EC) was first published in 1989 and was last updated in 2006. The objectives of the MD are to:

- Promote the free movement of machinery with the single market of the European Union
- Guarantee a high level of protection for EU workers and citizens.

A Directive is effectively a *law* in all member states. The MD aims to define essential requirements (in relation to the protection of health and safety and other aspects) which products must satisfy to benefit from the free movement of products across the internal market of the EU.

EU legislation does not prescribe specific technical solutions to meet the essential requirements. The directive is just a framework, European harmonised standards specify the various technical solutions.

Compliance with these harmonised standards is voluntary, but compliance gives rise to a *presumption of conformity* with the relevant essential requirements of the MD. If there is conformity with the relevant essential requirements, a manufacturer can claim CE compliance and place the CE logo on his machine.

Currently, the MD does not take into account the latest developments in for example digitalisation (internet of things, artificial intelligence, cybersecurity). For that reason, preparatory work for revision of the MD is under way[5]. Another reason given for an update to the MD is the perceived 'administrative burden and additional costs for operators due to requirements for paper documentation'. ■

Standards and Directives mentioned in this article

Directive 2006/42/EC

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

ISO 12100:2010 Safety of machinery — General principles for design — Risk assessment and risk reduction

ISO 20607:2019 Safety of machinery — Instruction handbook — General drafting principles

ISO/TR 22100-1:2015 Safety of machinery — Relationship with ISO 12100 — Part 1: How ISO 12100 relates to type-B and type-C standards

Where to order ISO 20607

Go to your national standards organisation, or order from: www.iso.org/standard/68519.html (accessed 5 November 2020).

However, I usually order standards from the Estonian Centre for Standardisation. Use this link for ordering ISO 20607: www.evs.ee/en/evs-en-iso-20607-2019 (accessed 5 November 2020).

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5. Revision of Directive 2006/42/EC on machinery: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1561710640331&uri=PI_COM:Ares(2019)132242 (accessed 6 November 2020); check the planning document at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=PI_COM%3AAres%282019%29132242&qid=1604653303413 (accessed 6 November 2020).