Department for Business, Energy & Industrial Strategy

A scoping study to explore best practice in product manual design

Research report

INDUSTRIAL STRATEGY

Contents

Executive summary

This report details the findings of the scoping study undertaken by The i-Team on behalf of the Office for Product Safety & Standards (OPSS) to explore best practice in the design and writing of instruction manuals with a focus on domestic products.

This scoping study involved exploring existing product manuals for domestic appliances across five categories: fridges & freezers, cooking appliances, dishwashers, washing machines and tumble dryers. The study was based on a sample of 25 domestic product manual sets selected from the public domain. Common industry practices and recommendations were also explored during this study, along with official standards and other guides.

For this scoping study, The i-Team defined a set of 142 criteria based on industry practices and official standards. The criteria involved various documentation features such as product identification data, safety information, page layout and text style. Each product manual set within the sample was reviewed against these criteria and given a score based on the number of criteria that were not satisfied. Most companies were consistent in their scores between products, ranging from 18 to 53 (13% to 37%) of criteria not satisfied. However, some companies showed a wide variation between products, with some manuals satisfying most of the criteria and others failing to satisfy over 50 (35%) of the criteria.

Many conventions in manual design have been identified from this study and it is recognised that product instruction manuals can come in various styles and formats. A5 non-colour printable version, text-based with some illustrations is found to be the most common format of manuals based on the sample. Layouts and font sizes can vary between the manuals reviewed, but they generally have a simple layout that appears to have been created using Microsoft Word or a similar word processor.

Based on the sample, the majority of manuals cover a single model in a product range, but it is also common for a manual to cover multiple products and variants. The style and quality of manuals between products within the same brand can vary. However, there seems to be no connection between the price of a product and the quality of its manual. Likewise, the length of a manual is not linked to its quality; one of the shortest manuals was among the best reviewed.

Safety information, installation, operation, maintenance and troubleshooting are generally included in the manuals; however, some companies choose to separate certain information into a smaller manual, often excluding the safety information. The i-Team considers this to be a risky practice as companies are assuming that consumers have read the safety section in another manual. Some of the manuals do not include what The i-Team considers critical safety information, such as electricity supply data and weight of the appliance.

Overall, the manuals reviewed appear to comply with much of the guidance issued in the standards, mainly the IEC/IEEE 82709-1:2019 standard - Preparation of information for use (instructions for use) of products. However, the manuals fail in certain areas, such as the font size and warning symbol height. Alternative formats such as audio files, braille or large-print versions do not seem to be available, despite the standard requiring suppliers to make provisions for users with sight or hearing impairments.

The i-Team considers the presentation of safety information within the manuals reviewed to be of the greatest concern. Although the information is generally detailed, little creativity in style, layout and presentation is apparent. Instead, the safety sections are many pages of densely

populated content, with tight line spacing, minimal headings and in no apparent logical order. The i-Team considers these to be risk-related issues that can affect readability of the manual and lead to misinterpretation or overlooking of vital safety information, particularly as studies suggest that the human brain can only process a certain amount of information at a time.

The exclusion or misinterpretation of any information that can compromise consumer safety is a concern and could have severe consequences. However, The i-Team regards many of the shortcomings in the manuals as avoidable if standards and industry best practices are followed, although there are some possible barriers to change that would need exploring further. This includes financial and psychological barriers. A well-produced manual in The i-Team's view is the outcome of a well-established documentation process, dedicated resource and careful selection of tools. For some organisations, establishing such a process would require changing long-established conventions as well as require unbudgeted financial investments.

A preliminary set of best practices has been identified by The i-Team as part of this study with domestic appliances in mind. These best practices are based on the standards, industry practices and recommendations and The i-Team's own experience and knowledge of working with a vast number of companies to produce technical manuals over the last two decades.

The challenge of better presenting safety information in a digestible format also needs exploration. A few suggestions are to supply quick-start guides with safety notes or a safety card with good-quality illustrations and minimal text. The i-Team suggests further research is carried out to understand consumer behaviour and the psychology behind people's various degrees of interaction with product manuals. This may lead to the development of a revised set of best practices for creating more effective product instruction manuals.

Background

This section details the reasonings behind the initiation of this study by OPSS to explore best practice in the design and writing of product instruction manuals.

Consumers generally expect to find an instruction manual within the packaging of a new product, communicating how to use a product safely and effectively. Provision of such a document is a legal requirement, and the General Product Safety Regulations 1994 state that to assess the safety of a product, instructions for assembly, use, maintenance and disposal must be taken into account. Likewise, according to the EMC Directive 2014/30/EU "apparatus shall be accompanied by information on any specific precautions that must be taken when the apparatus is assembled, installed, maintained or used." A well-designed product manual therefore can be beneficial to consumers in many ways. However, evidence suggests that the information in product manuals can be perceived by consumers in different ways or even ignored. A study published in 2013 highlighted that people read manuals and use all the features of a product only 25% of the time.[1] Similarly, a research paper by Schriver et al that examined the interactions of users with several consumer products, found four categories of how instructions are used or perceived, of which one group (19%) ignored manuals.[2]

Taking into consideration that many safety-related incidents take place despite the availability of instruction manuals, it is probable that improving the readability and quality of these manuals may contribute to the protection of consumers. To make such improvements, it is necessary to understand the conventions followed in designing manuals and the creative formats used, with the view to identifying what really is best practice, what changes would create the most impact, and the possible barriers to change.

This scoping study was therefore initiated by OPSS in January 2019 to explore best practice in manual writing. The study forms one part of the Office's Strategic Research Programme (SRP) to commission high-quality science-based research, strengthening the evidence base for the development of product safety policy and its delivery and enforcement. The study was conducted as a research project based on a literature review to identify relevant official standards and industry best practices, followed by a review of a sample of domestic appliance manuals in light of those standards and practices.

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[1] Mehlenbacher B, Wogalter MS, Laughery KR. On the reading of product owner's manuals: Perceptions and product complexity. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting 2002 Sep (Vol. 46, No. 6, pp. 730-734). Sage CA: Los Angeles, CA: SAGE Publications

[2] Schriver, Dynamics in document design: Creating texts for readers (Toronto: Wiley & Sons, 1997)

Aims, objectives and project scope

This section summarises the main aims and objectives of the study and the project scope defined by The i-Team and OPSS.

Aims and objectives

The aim of this study was to explore best practice in product manual writing with a focus on domestic appliances.

The main objectives were to understand:

- What conventions are followed in the design of existing user manuals.

- What creative formats are being used and what best practice can be identified.

- What problems can be caused by ignoring or misinterpreting information or if information is missing.

- What barriers to change exist.

- What further work might OPSS undertake.

Project scope summary

The scope of the project was firstly to review literature on the subject of the design of product instruction manuals in order to understand guides, standards and industry practices. Subsequently, this led to a review of some existing domestic product manuals to understand current conventions and creative formats in use. A sample of 25 manual sets from the public domain was taken for review. The sampling approach is detailed in the Research methodology section and the review criteria are detailed in the Manuals review section.

Note: It was not within the scope of this study to examine information included on packaging of products. Nor was it within the scope of this study to examine information supplied with the product during the sales process, although this information may have a significant effect on the safe use of a product. This is an area where we recommend that further research is conducted.

Research methodology

This section details the literature review and sampling approach used in the scoping study.

Literature review

The first part of the research involved reviewing existing literature on product manual writing. This included looking at directives, regulations and published standards and guides. Industry practices were then explored, mainly by consulting books and articles on the subject of technical authoring and manual writing. The purpose of this review was to compile a list of criteria against which to assess a selection of product instruction manuals.

The research also aimed to identify current best practices. It became apparent that identifying best practices required an understanding of the psychology behind how people learn and digest information. This was therefore touched upon and contributed to the definition of best practices and The i-Team's suggestions on extending this scoping study to better understand consumer behaviour towards instruction manuals.

Sampling approach

A sample of 25 product instruction manual sets from the public domain was taken. Initial research indicated that there are a large number of products available, with over 30 brands for white goods and cooking appliances in the UK; however, some of the larger manufacturers produce appliances for more than one brand name. The manufacturers range from multinational corporations producing a wide range of goods to smaller manufacturers producing just one or two types of appliance. There are also own-brand appliances that are produced by third-party manufacturers.

Most manufacturers produce appliances of several types, and for each type there is a range of products. Each range may consist of low-end, mid-range and high-end products. The low-end products have basic features and are cheaper; the high-end products have more features and are therefore more expensive; the mid-range products include some of the additional features and are priced in the middle of the range. For example, a manufacturer may produce low-end washing machines at £300-£400, mid-range machines at £500-£700 and high-end machines in excess of £1000. For each appliance type to be sampled, a mid-range option was selected.

The large appliances fall into 10 main categories, which for convenience are grouped as follows:

- Fridges & freezers (refrigerators, freezers and fridge-freezers)

- Cooking appliances (hobs, ovens and microwave ovens)

- Dishwashers

- Washing machines (including washer-dryers)

- Tumble dryers

OPSS suggested a spread of manufacturers including multinational corporations, independent manufacturers and own-brand suppliers.

A list of company names was made available to The i-Team. These are referred to as Companies A-G.[3] This list comprised three multinational corporations (A-C), an independent manufacturer (D) and three own-brand companies (E-G).

Five products were selected for each company (A-D) in the multinational and independent categories. A further five products were selected for the own-brand category, but in this case the products came from three companies (E-G), as shown in Table 1.

Table 1: Product selection by company

Company	Manufacturer category	Number of products
A	Multinational	5
B	Multinational	5
C	Multinational	5
D	Independent	5
E	Own-brand	3
F	Own-brand	1
G	Own-brand	1

In order to produce a balanced sample, five products were selected for the Fridges & Freezers group; six each for the Cooking Appliances and Washing Machines, to reflect the wider range of appliances available; and four for the Dishwashers and Tumble Dryers. These were spread across the seven companies, as shown in Table 2.

Table 2: Number of samples by appliance group and company

Appliance group	Co. A	Co. B	Co. C	Co. D	Companies E-G
Fridges & Freezers	1	1	1	1	1
Cooking Appliances	1	1	1	1	2
Dishwashers	1	1	1	1	
Washing machines	1	2	1	1	1
Tumble dryers	1		1	1	1

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[3] Manufacturer names are kept anonymous in this study as the manuals were critically reviewed as part of an overall objective to understand existing practice, conventions and creative formats. It is not the aim of this study to review the quality of manuals for specific manufacturers.

Finally, for each of the company/appliance group combinations, selections were allocated to one specific appliance type. This allocation was done randomly, within the confines of the requirement to review a spread of appliances within each appliance group. In this way, The i-Team selected a sample of 25 products to produce the sample grid in Table 3. Some products are supplied with more than one manual, so a total of 44 manuals were reviewed.

Table 3: Products selected for review

Appliance group	Appliance type	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
Fridges & Freezers	**Fridge**		X		X			
Fridges & Freezers	**Freezer**	X						
Fridges & Freezers	**Fridge-freezer**			X		X		
Cooking Appliances	**Hob**		X		X			
Cooking Appliances	**Oven**	X				X		
Cooking Appliances	**Microwave oven**			X			X	
Dishwashers	**Dishwasher**	X	X	X	X			
Washing machines	**Washing machine**	X	X		X	X		
Washing machines	**Washer-dryer**		X	X				
Tumble dryers	**Tumble dryer**	X		X	X			X

The products selected were all mid-range for the company/appliance group combination. Appendix B includes full details of the anonymised samples.

Review of samples

A set of criteria was defined, involving various documentation features such as product identification data, safety information, page layout and text style. Each manual for the selected products was reviewed against these criteria and the findings recorded.

Appendix C lists the review criteria and Appendix D includes the full set of information recorded for the 25 products.

Directives, regulations and standards

This section details existing regulations, standards and guides on instruction manual writing from which a list of criteria were drawn for reviewing the sample of manuals.

Directives and regulations

Table 4 summarises some of the directives and regulations applicable for producing instruction manuals for electrical and gas-based domestic appliances. A more detailed summary of the regulations and directives is included in Appendix A.

Table 4: Directives and regulations for producing instruction manuals

Directive/regulation	Summary
The General Product Safety Regulations 2005	The General Product Safety Regulations 2005 set out a number of matters which must be taken into account in assessing the safety of a product. These include instructions for assembly, use, maintenance and disposal of the product. The obligations of the producers and distributors of products are also covered by the regulation.
The EMC Directive 2014/30/EU	This directive applies to electrical appliances. The directive specifies in detail the essential requirements a product has to meet in order for the manufacturer to affix the CE marking. One of the requirements is the provision of an instruction manual covering safety information, installation, usage and maintenance where applicable.
Regulation (EU) 2016/426	This regulation covers appliances burning gaseous fuels used for cooking, heating, hot water production, refrigeration, lighting or washing. According to this regulation, for CE marking to be applied on gas appliances, it must be examined externally by a Notified Body. For this examination to take place, the required technical documentation must be made available to the Notified Body. This includes instructions for installation and usage of the appliance.
The Ecodesign Directive (2009/125/EC)	This directive outlines the ecodesign requirements and environmental limits that need to be met by manufacturers so that they can hold the CE marking.

Standards and guides

While the regulations and directives stipulate the requirements for supplying instruction manuals, they do not provide guidelines on producing the actual manuals. There are various standards published by ISO, IEC and IEEE that may assist manufacturers with writing product manuals. The standards are divided into various categories and the exact selection would depend on the product type, document type, format and how graphics and illustrations will be used. A summary of a selection of standards is provided in Table 5 and Appendix A includes further detail for some of the standards and other potentially useful standards and guides to produce instruction manuals.

Table 5: Selection of standards relating to product manuals published by ISO and IEC

Standard/guide	Summary
IEC/IEEE 82079-1:2019	The main standard for writing instruction manuals is IEC/IEEE 82079-1:2019.[4] This standard provides general principles and detailed requirements for the design and formulation of instruction manuals (referred to in the standard as 'information for use'). The standard provides information on the content of manuals, written style, formats, graphical symbols, information management and the review process. Key principles and guidance of the standard is detailed in Appendix A.
The ISO/IEC Guide 71:2014	This guide provides guidance to standards developers on addressing accessibility requirements. Many suppliers now provide online versions of product documentation and some even set up complete web portal systems with product documentation.
IEC 62507:2010	This standard specifies basic requirements for the identification of objects and products.
IEC 61355-1:2008	This standard describes rules and guidelines for the classification and identification of document types.
Standards related to graphical symbols	A vast number of standards and guides are available for the usage of graphical symbols. These guides and standards are mainly relevant to the usage of graphical symbols on the products/equipment but the principles can be applied to the usage of graphical symbols within manuals.

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[4] The 2019 edition of the standard cancels and replaces the first edition IEC 82079-1:2012.

Manuals review

This section summarises the findings from reviewing the sample of manuals for a total of 25 appliances, covering five product categories.

Review criteria

The manuals were reviewed against a selection of criteria from the IEC/IEEE 82079-1:2019 standard, with additional criteria included from the literature review and identification of industry best practices.

The review criteria were grouped as follows:

- **Preliminary information**: manual specification, product and document identification, company information.

- **Manual content and structure**: product details, safety, efficiency and energy saving, installation, operation, cleaning and maintenance, translations.

- **Document style**: navigation options, illustrations and tables, presentation and creativity, style and quality of text.

The full set of criteria is included in Appendix C.

How the review criteria were chosen

The IEC/IEEE 82079-1 standard sets out general principles and detailed requirements relating to the preparation of instructions for use. Section 5 of the standard sets out general principles, section 6 discusses the information management process recommended, section 7 specifies the content that is expected in instructions for use, section 8 relates to document structure and section 9 covers the format of the instructions. The review criteria were largely based on this standard. Sections of the standard that were not applicable to the types of appliance being reviewed were not included.

In addition, a number of criteria were added as a result of the research into common practices in the technical authoring industry. This ensured that the sample of manuals could be tested against current best practice. Further criteria were included in order to record the format and layout of the manuals.

A total of 142 criteria were tested for each product. Of these, 104 were taken from the IEC/IEEE 82079-1 standard, 32 were based on industry best practices and 6 related to document format.

Summary of findings from reviewing manuals

Preliminary information

- Document identification is limited and information on revisions is missing in all cases.

- Contact details and warranty information tend to be found on the company websites rather than within the manual.

- Compliance with standards tends to be referenced without any formal certificate being included, although most manuals carry CE marks.

- Most manuals include a statement 'Keep for future reference', but it is not always prominent.

Manual content and structure

- The manuals in general include the following information: safety, installation, operation, maintenance and troubleshooting.

- Most manuals cover a single product range and one model, but it is also common for product variants to be included.

- Safety information is included in all manuals. Although they are generally comprehensive, some important information is missing from most of the manuals.

- A separate installation manual is sometimes provided and technical repair information is usually not included.

- The reviewed manuals in general contain sufficient information to install and use the product, but sometimes specific information can be difficult to find and some lack information on dealing with problems.

- Most manuals fail to identify instructions that relate to specific models or model variants in a clear, unambiguous way.

- On the whole, there appears to be a strong relationship between the length of manuals and the degree of alignment with the criteria, but one concise manual has proven that it is possible to be both brief and effective.

Document style

- The most common format for manuals is PDF black and white printable versions. All manuals can be downloaded from company websites.

- The sizes of the manuals can vary and the following were among the sample: A4, A5 and several unconventional page sizes.

- Manuals adopt various layouts including single column, double columns or three columns. A combination is sometimes used.

- Manuals are mainly text based with some illustrations. Little creativity is apparent, all adopting simple layouts, possibly created with Microsoft Word or a similar tool.

- Indexes that can aid navigation are not included in any of the manuals reviewed and only one manual includes a glossary.

- The safety section is all text based with some warning symbols, although these are rarely of the size required by the IEC/IEEE 82079-1 standard.

- Line spacing and white space are generally good but there are examples of cramped, difficult-to-read manuals.

- Spelling, punctuation and grammar are mainly good, with only a few occurrences of poor grammar or US spellings in UK versions.

- Page numbers are used but section numbers feature in only a small number of manuals.

The findings from the review are provided in more detail below, with screenshots of pages from manuals. The tables give the number of products sampled that satisfied certain criteria; these values are derived from the full set of results given in Appendix E. The i-Team's views on the findings are also provided with some recommendations for improvements.

Preliminary information

Company, product and document identification

Table 6 shows the number of products (out of 25) that satisfy criteria relating to company, product and document identification.

Table 6: Number of products satisfying company, product and document identification criteria

Criteria	Number of products
Document identification number included	22
Product name and number included	20
How to obtain revised manuals	0
Publication date	6
Statement 'Keep for future reference' included	24
Contact details within manuals provided	8
Compliance with standards referenced	20
CE marks displayed	17

Product details are generally included on the front page of manuals and most include a document identification number on the back page. However, none of the manuals include details of how to obtain updated manuals, and most do not include a publication date.

The IEC/IEEE 82079-1 standard states that manuals should include a prominent statement in the form 'Keep for future reference'. Only two manuals do this, although all manuals include such a statement somewhere in the body of the text.

Most companies rely on their websites to provide contact details, customer service details, online help, registration benefits and warranty details, but tend not to include this information within the manuals.

The majority of manuals have CE marks and compliance with standards tends to be referenced rather than including statements of conformity.

Manual content and structure

Structure and length

Table 7 shows the number of products (out of 25) that cover single or multiple models and the number that satisfy structure and length criteria.

Table 7: Structure and length variation by number of products

Criteria	Number of products
Single model manual	15
Multiple models manual	10
Concise and effective in The i-Team's view	11
Acceptable length in The i-Team's view	8
Unreasonably lengthy in The i-Team's view	6

The structure is similar between the manuals reviewed. They all contain sufficient information to install and use the product, but sometimes specific information can be difficult to find as they are not always where the users would expect to find them. This impacts the usability of the document, as research shows that readers like predictability and common structures and also like to skim read. If users do not find the right information in the expected location, they will lose interest in reading any further.[5]

Just over half the manuals are dedicated to a single product model but inclusion of up to six models in a single manual were found. Where multiple models are covered, information on the variations is not clearly presented and is often vague.

Many of the models also have further variants but it is generally not made clear what variants are covered by the manuals and the sections relating to a particular variant are often not clearly labelled. The i-Team's concern is whether such a manual will hold the interest of users looking for instructions on a particular model or variant or if the product has slightly different features to those described in the manual. These are questions to be asked and answered by

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[5] Mark Achtelig, *How to Write That F***ing Manual*, (Indoition Publishing, 2012), 17

extending this study to research consumer behaviour and how users perceive and use instruction manuals.

There is considerable variation in the length of manuals. On the whole, there appears to be a strong relationship between the length of manuals and the degree of alignment with the criteria. The shorter manuals either omit some of the information regarded as essential by the IEC/IEEE 82079-1 standard or they are printed in a small font, with tight spacing, making them more difficult to read. However, it should be noted that the manuals for one company are among the shortest and yet are highly aligned with the criteria, proving that it is possible to be both brief and effective. Surprisingly, the average number of pages by product type does not seem to relate to the complexity of the product. For example, the manuals for a fridge and a washing machine for the same company are of similar length.

Product details and operation instructions

Table 8 shows the number of products (out of 25) that satisfy criteria relating to the product description and operation of the product.

Table 8: Number of products satisfying product description and operation criteria

Criteria	Number of products
Product description included	23
How to operate the product – instructions included	24

Almost all manuals include the information a user would expect to find, such as a description of the appliance, its dials, settings and programmes. However, there are some that are missing suitable diagrams and some that assume the user will have basic knowledge of the appliance's potential uses. The scope of this research did not cover instructions attached to the product itself, which could include operating instructions.

Product details and technical specifications are generally included but some manuals fail to include the weight of the appliance. Depending on where a user chooses to install the appliance, for example a worktop, this can be dangerous.

Most manuals fulfil the majority of requirements of IEC/IEEE 82079-1 with regard to operation of the appliance. However, there are some areas where the requirements tend not to be met; for example, half the manuals do not provide details of a suitable operating environment and less than half the manuals provide information on dealing with power failures and other emergency stops.

Safety information

Table 9 shows the number of products (out of 25) that satisfy criteria relating to safety.

Table 9: Number of products satisfying safety criteria

Criteria	Number of products
Safety section included	25
Electrical supply data included	23
Risks and hazards visually highlighted by symbols of adequate size	6
Information on vulnerable groups included	25
Safety information is easily found in The i-Team's opinion	23
Some important safety information missing in The i-Team's opinion	24

Safety information is included in all the manuals. Although some manuals are comprehensive, covering safety from various angles, some important information is missing in many manuals. For example, all manuals include warnings about the risk of fire but only one of the 25 manual sets provides details of how to deal with a fire. A small number of manuals include statements or warnings not to modify the product, but this information is missing in most cases. Electricity supply data is also missing in a few manuals. Omitting such critical safety information can have an impact on consumer safety, as detailed later in this report.

All manuals include safety information relating to vulnerable groups, such as children, older persons, persons with disabilities or those with heart pacemakers or who suffer allergic reactions to specific chemicals. In most cases, the wording is similar between companies. There is also some information on the dangers of poisoning or irritation, where applicable.

The warnings are generally conspicuous and most manuals use at least some of the standard safety symbols. However, these symbols are often smaller than the recommended size and frequently are not accompanied by signal words (Danger, Warning, Caution) and also not explained in the introductory text.

In those cases where there is more than one manual for a product, it is rare for the safety information to be repeated in the other documents.

Efficiency and energy saving

Table 10 shows the number of products (out of 25) that satisfy criteria relating to efficiency and energy saving.

Table 10: Number of products satisfying efficiency and energy saving criteria

Criteria	Number of products
Energy consumption and efficiency details included	20
Tips for efficient use included	22

Most manuals include details of energy consumption and emissions, and information on efficient use of the product, including tips for improved efficiency. However, a number of manuals omit some or all of this detail.

Installation

Table 11 shows the number of products (out of 25) that satisfy criteria relating to product installation.

Table 11: Number of products satisfying product installation criteria

Criteria	Number of products
How to install the appliance – instructions included	22
Dimensions and space requirements included	23
Weight of the appliance included	16
Separate installation manual/section	22

Installation instructions are generally included but there is a tendency for them to be placed in inappropriate places. Sometimes they are located at the end of the manual, rather than the front, and in one case the installation instructions form part of the safety information. As installation is one of the first sets of instructions a user is likely to need to set up the product, it is vital that this information is readily available when first consulting the manual. Some companies also choose to separate the installation section from the main manual and create a smaller document, often excluding the safety sections. Providing a separate installation manual could work well, considering installation instructions for domestic appliances often only need to be used once; however, the issue is the omission of the safety instructions, as companies often assume that the consumer has read the safety instructions in another manual.

Minimum space requirements are given for most products; however, in some cases these values are given in either the safety information or on data sheets, rather than within the installation instructions. This again could have an impact on the user experience, as minimum space requirements could be crucial to a successful installation.

Unpacking the product prior to installation is sometimes included but if the manual is placed inside the packaging, then this information is of little value. The i-Team recommends quick unpacking instructions on the packaging, separate from the manual.

Cleaning and maintenance

Table 12 shows the number of products (out of 25) that satisfy criteria relating to cleaning and maintenance.

Table 12: Number of products satisfying cleaning and maintenance criteria

Criteria	Number of products
Cleaning information included	25
Maintenance section included or not necessary	17
Information for specialist repairers	1
Spare parts details included	13
Disposal information included	25

Cleaning instructions are well covered in most manuals while user maintenance is covered by only some companies. The most effective manuals provide simple illustrations for cleaning and maintenance tasks, with numbered steps, and troubleshooting is best presented in clear, logical tables.

Potentially useful information is missing from some manuals, such as performance data and improved efficiency and recycling. However, while the standards require such information to be included, The i-Team believes that these omissions are unlikely to have an impact on the usability of the manual. In most cases, the user would not notice that this information is missing.

None of the manuals provide technical information for specialist repairers and this suggests that this information is only provided upon request or not designed for consumers, or not available at all.

Spare parts are not generally covered by the manuals, but as these are generally required by skilled repairers, it is an area of less importance for users.

All manuals provide information about disposal of appliances at end of life. There are two main formats for this information and the wording is similar between companies in each case.

Translations

Only three documents have multiple languages. In those cases, the languages are clearly identified and the organisation of the translations is either with multiple languages within each section or separate parts of the manual are designated for each language.

The manuals with multiple languages clearly identify the translated sections with standard language codes. However, it is often apparent that manuals have been translated from other languages to English and not necessarily written in English. Those manuals would benefit from editing and proofreading to correct grammatical errors.

Figure 1 shows an example of a page with multi language instructions and an example of a page from a manual that was likely to have been translated from a foreign language to English.

Figure 1: Translated pages from manuals
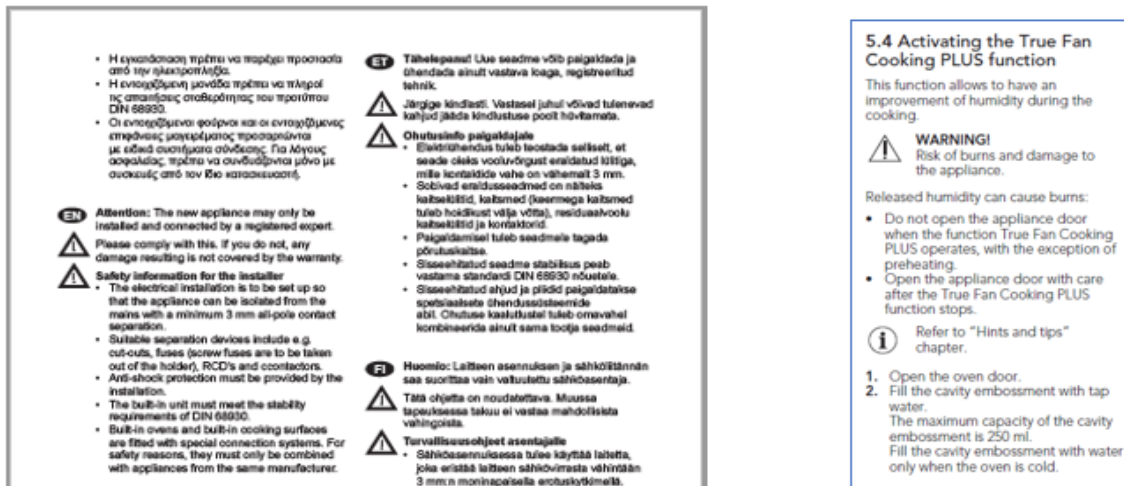
Multi-language installation instructions　　　*Example of poor translation*

Navigation options

With the exception of three manuals, all include a detailed contents list. However, none of the manuals include an index and only one has a glossary. The lack of an index in particular can make navigation hard in lengthy manuals.

Page numbers and headings are well used but only one company numbers its headings. Heading numbers can aid navigation and assist with cross referencing; however, the industry recommendation is to use links and cross references sparingly.

Document style

Format and layout

Table 13 shows the number of products (out of 25) that have manuals for each type of page format or layout.

Table 13: Number of products for format and layout variants

Criteria	Number of products
A5	12
A4	5
Other	8
Single column	2
2 or more columns	23
Produced using Word or similar	22
Produced using other tools	3

The level of consistency with regards to design and styles varies between companies. While some manufacturers prefer to use a consistent style for manuals regardless of the product type, others use different styles for different product categories, which is indicative of a lack of company-wide guidelines

All manuals reviewed are black and white versions; none of the manuals are available in colour. The most likely reason for this is to keep printing costs low in The i-Team's opinion.

The IEC/IEEE 82079-1 standard specifies that suppliers should make provisions for users with sight or hearing impairments. None of the companies appear to make alternative versions (e.g. large print, braille or audio files) of the manuals available, although all the manuals can be downloaded as PDFs and the print size can be expanded on the screen. The most common page size for manuals is A5, followed by A4; other unconventional page sizes are also used. The page format chosen for manuals has an impact on the readability of the instructions and how easy they are to handle. From the review, The i-Team considers that A5 manuals are generally more accessible than A4. Choosing a non-standard page format means that manuals reproduced on a standard A4 printer will have wasted space on each page.

The common layout is either one or two columns, with a small minority using up to three columns. The i-Team considers that pages are more likely to be clear and well presented with good use of space when just a single column is used for A5 pages and two columns are used for A4 pages. While most companies are consistent in page size across all their products, those that choose something other than A4 or A5 tend to use different sized pages for different product manuals, suggesting the lack of a style guide for manuals.

Some examples of layout are shown in Figure 2.

Figure 2: Page layout examples
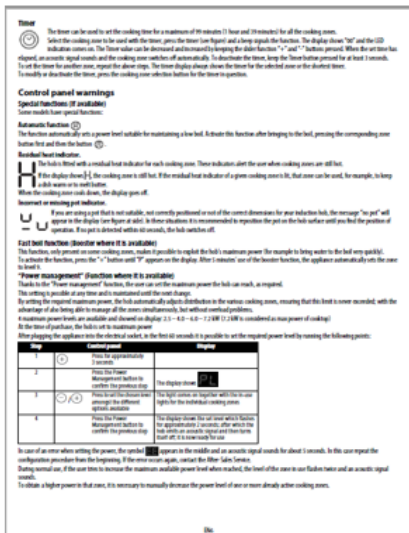
Single column, 170x240mm (midway between A5 and A4)
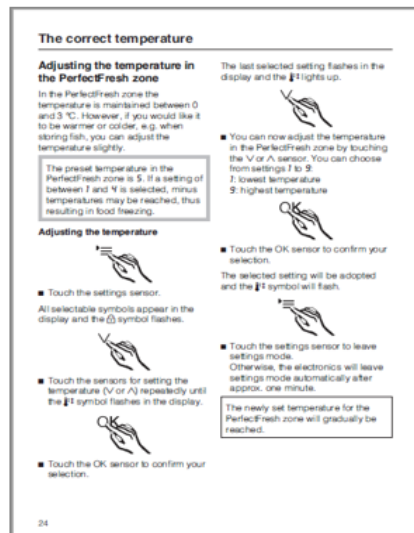
Two columns, 148x210mm (A5)

Three columns, 210x297mm (A4)

Tool used

The tool used to create a manual is not usually apparent. In all but three cases it is likely that the manuals were produced using Microsoft Word or a similar word processor, as the layout is simple and little effort has been made to create complex designs. The other three manuals were likely to have been produced using desktop publishing software.

Presentation and creativity

Table 14 shows the number of products (out of 25) that satisfy criteria relating to presentation and creativity.

Table 14: Number of products satisfying presentation and creativity criteria

Criteria	Number of products
Clear layout throughout	10
Adequate size of font throughout	12
Simple, unambiguous language	14
Good use of symbols	6
Good layout for safety information	3
Good layout for installation instructions	22
Installation instructions in appropriate place	10
Good layout for operating instructions	24
General style and quality of text good	15
Information easy to find	14
Good quality illustrations	23
Illustrations well used with text	24
Clear tables	21
Tables easy to use	21

Although it is essential to include all the relevant information, a creative style can help to engage the reader. Little creativity is apparent in the design of the manuals but many of them have a clear layout, with a sufficiently large font and good use of white space. However, there are a significant number that suffer from a cramped, difficult-to-read layout and many where the font size does not meet the specifications in the IEC/IEEE 82079-1 standard.

Symbols and icons are commonly used in the manuals. Some use the well-known ISO symbols or similar, while others use a combination of ISO and their own symbols. The i-Team believes that symbols are often being used to improve the appearance of manuals and do not add to the clarity of the instructions. Some companies do not explain the meanings of the symbols at any point in the manual and signal words (Caution, Warning, Danger) are usually not attached. The symbols also generally fail to meet the minimum 10mm height specified by the IEC/IEEE 82079-1 standard.

Safety information presentation

The presentation of the safety information requires discussion in some detail. In most cases, safety information is presented at the start of the manual, usually after the table of contents. All manuals include information on the safe and correct use of the appliance, restrictions on use, precautions to be taken, potential hazards and health risks. However, there is a tendency to present safety information in a smaller font, with tight line spacing and very little white space, making it difficult to read and unattractive for users. Although most manuals use illustrations effectively in the main body of the text, very few manuals use illustrations to improve the accessibility of the safety information.

Most manuals, with very few exceptions, provide additional warnings at appropriate points in the documentation and the warnings are generally conspicuous. Among those companies who provide more than one manual for the product, only one company repeats safety information at relevant points in other manuals. It is essential that important safety warnings are repeated, rather than assume that users have read the safety section in another manual. All the manuals include at least some of the standard safety symbols but explanation of those symbols is rarely included.

In general, while the companies cannot be faulted for the quantity of safety information they provide, they could do far more by way of illustrations, subheadings and improved layout to make this information more accessible and therefore more likely to be read and understood. Figure 3 shows two different layouts of safety information.

Figure 3: Safety information layout examples
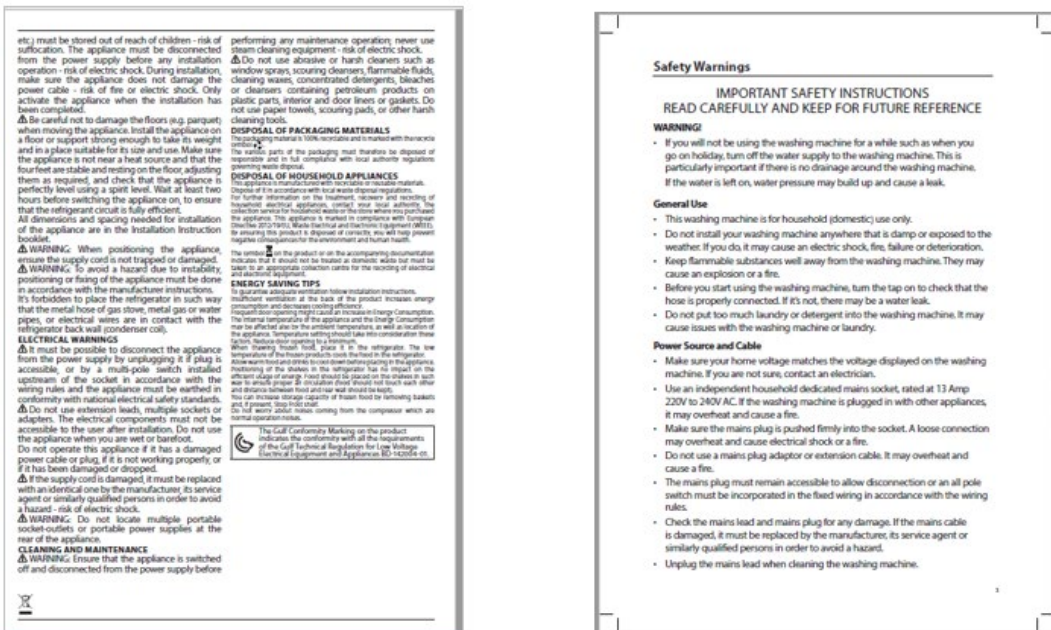
(Left) Densely packed safety information, with small font and other topics included (A4 page)

(Right) Clearly presented safety information (191x264mm)

Operation section presentation

The operation section is usually mainly text based with some illustrations and diagrams, although some manuals do not include any diagrams, the inclusion of which The i-Team thinks could be helpful.

Installation section presentation

Installation instructions are usually text based with some diagrams and illustrations but a small number of companies use only diagrams to convey installation instructions. Figure 4 shows an illustration-only based instruction and instructions combined with a diagram.

Figure 4: Installation instruction examples
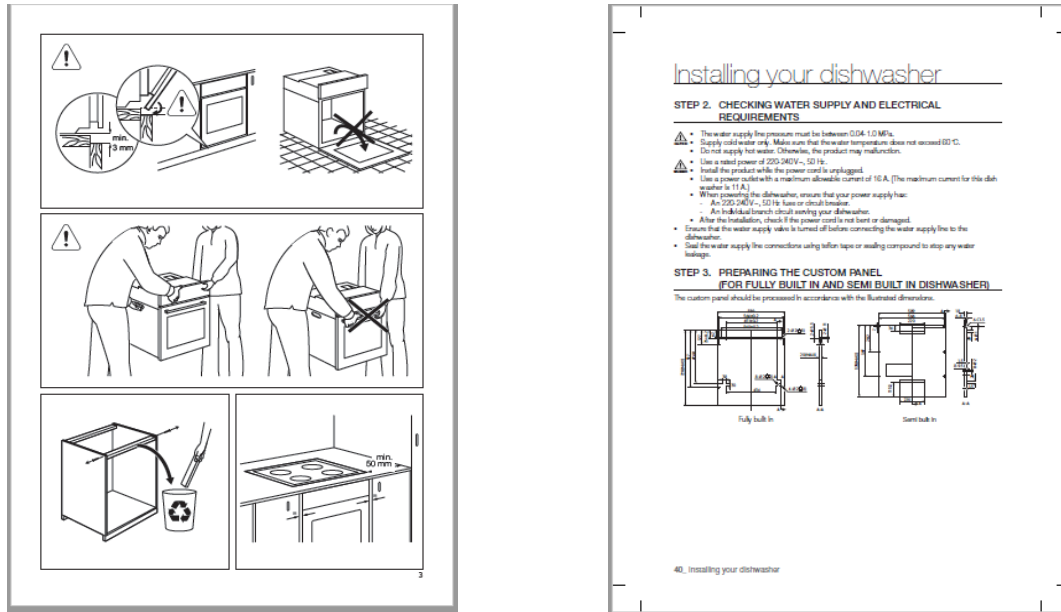
Illustration-only installation instructions   *Installation instructions with diagrams*

The i-Team considers the use of illustrations for installation instructions to be effective but also believes it is important that clear and concise written instructions are included with the illustrations. This is to avoid the risk of diagrams being misinterpreted. A well-fitted appliance is paramount to safety and therefore the instructions cannot afford to have ambiguity.

Illustrations and tables

Illustrations are well used in all the manuals, with good-quality line drawings. In some cases, shading is used to very good effect, particularly in detailed diagrams, and this approach could be adopted by other companies. Good illustrations reduce the amount of text that is needed and help people to understand more quickly the information being given. Similarly, table styles are clear in all but one manual.

Style and quality of text

Text quality is generally good, easy to understand, uses active voice and is respectful (that is, it does not use prejudiced or patronising expressions and it does not make assumptions or use stereotypes relating to older people, people with disabilities etc.)

However, some manuals fall short in these respects. Some manuals use US spellings for a UK version. Spelling, punctuation and grammar are mainly good, with only a few occurrences of poor grammar or other errors. All manuals are easy to understand and there is little unnecessary or repeated information. Terminology is consistent but there are incidents of unexplained terms.

Alignment with review criteria

The review findings, in particular the degree to which manuals were found to be aligned with the test criteria, show that, in general, the level of alignment with the review criteria is similar across the manuals for any particular company. Most companies use a similar style of manual for all products, and therefore produce a similar level of alignment with the criteria. Only one company shows significant variation, with some manuals being extremely brief and failing to satisfy many of the review criteria while others are long and detailed but mainly satisfy the criteria. This suggests that the product documentation may have been prepared by different departments, with only limited company-wide guidelines.

Each manual was tested against 142 criteria and given a score based on the number of criteria that were not satisfied. Therefore, a low score indicates good alignment with the criteria while a high score suggests that manuals are less effective when it comes to compliance with standards and best practice. Most companies are consistent in their scores between products, ranging from 18 to 53 (13% to 37%) of criteria not satisfied. However, some companies show a wide variation between products, with some manuals satisfying most of the criteria and others failing to satisfy over 50 (35%) of the criteria.

Table 15 and Figure 5 below show the minimum and maximum scores for the manuals for each company and the average score in each case.

Table 15: Minimum, maximum and average scores by company

	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
Min. score	33	26	18	27	22	40	38
Max. score	37	35	33	53	24	40	38
Ave. score	**35**	**29**	**26**	**38**	**23**	**40**	**38**

Figure 5: Minimum, maximum and average scores by company
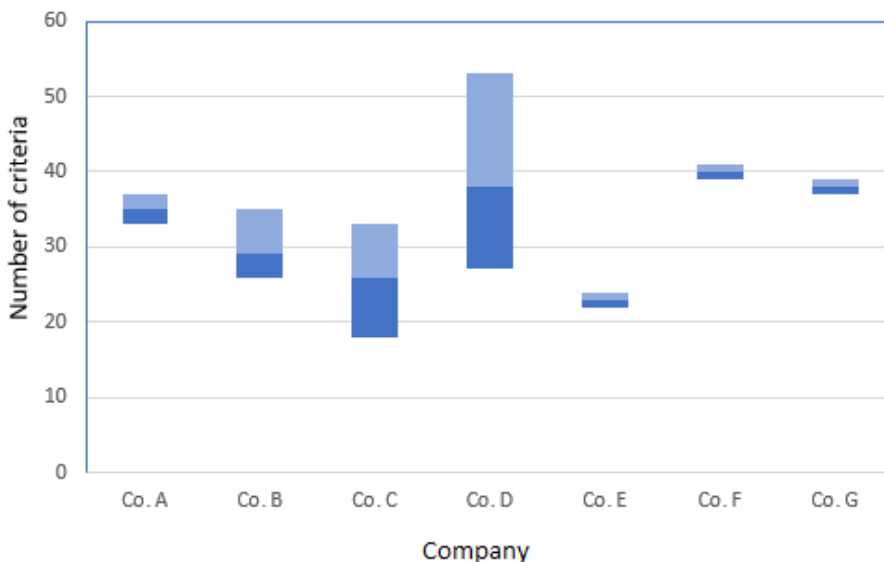
Consequences of ignoring, misinterpreting or missing information

The review of the manuals has highlighted a number of areas where problems might arise if users either ignore or misinterpret documents or if important information is missing from the manual. This could include:

- Accidents arising from a lack of understanding of general safety instructions.

- Dangerous situations such as fire, electrocution or flooding due to poor installation or incorrect use of an appliance.

- Installation in unsuitable environment.

- Accidents due to incorrect handling of the appliance such as lifting it.

- Inefficient use of the appliance.

- Unnecessary problems due to faults not being dealt with correctly.

- Faults arising as a result of poor maintenance.

- Incorrect disposal of packaging of the appliance.

The i-Team believes that further research is required to understand how users interact with instruction manuals and what improvements could be made that would result in essential information being better communicated.

Industry practices

This section provides information on industry practices and recommendations identified by The i-Team. It also briefly covers human psychology and how information is perceived and processed, for the purpose of defining best practices.

Professional bodies

The Institute of Scientific and Technical Communicators (ISTC)

The Institute of Scientific and Technical Communicators (ISTC) is the largest UK body representing information development professionals. Its aim is to promote better technical and scientific communication, mainly by sharing best practices and standards, providing networking opportunities and access to resources. Many technical authors and authoring companies including The i-Team are part of ISTC and follow common standards and practices.

Controlled languages

Technical writing is often based on a controlled version of English that writers and organisations may adopt. Two well-recognised controlled languages are summarised below.

The ASD-STE100 Specification

ASD-STE100 is a controlled specification originally developed for the aerospace industry to assist non-native speaking staff to better digest instructions for aircraft maintenance. ASD-STE100 is now officially known as Simplified Technical English (STE) and used by many industries. It is updated every three or four years based on feedback from users.

The STE Specification provides writing rules and a dictionary containing controlled words with one meaning per word. As long as a word is covered by one of the categories listed in the Specification, it can be used, although company-specific or project-oriented words are allowed.

The main STE rules are summarised below:

- Limit the length of noun clusters to a maximum of three words.

- Limit sentence lengths - 20 words for procedures or 25 words for descriptive sentences.

- Limit paragraph lengths to six sentences in descriptive text.

- Do not use colloquial or 'slang' and jargon but allow for specific vocabulary.

- Use words like 'a', 'an' and 'the' where possible.

- Use simplified verb tenses (past, present and future).

- Use active voice and present commands in the form of warnings and cautions.

- Write steps which form part of a sequence as separate sentences.

Plain English

Plain English is a style of writing used by many organisations, including some government departments. Plain English principles are similar to STE but can be regarded as more flexible and adaptable to various industries and document types, while STE was developed for simplifying language in product manuals. According to John Eveland, ASD-STE100 is often regarded as much better language for non-native English speakers because all ambiguity is removed.[6]

Industry practices on manual writing

Much has been said by experts in the technical authoring industry on the subject of writing user manuals. These are typically senior technical authors that have over the years identified challenges and provided recommendations through the publication of books and articles.

In an article by Ferry Vermeulen, it is implied that the key to producing an effective user manual is to use a good template.[7] Vermeulen strongly encourages the use of the IEC/IEEE 82709-1:2019 standard to produce instruction manuals or to purchase a template based on this standard.

Similarly, Kieran Morgan, in his book Technical Writing Process, discusses how to write technical manuals effectively and provides practical tips on managing documentation projects. According to Morgan there are five steps to effective technical writing that are universal for all documentation projects: plan, structure, write, review, publish.

Morgan recommends direct communication with the audience to understand how they will interact with the document to be written but acknowledges possible barriers, for example interacting with clients is sometimes not seen as part of a technical author's role. Morgan recommends building a profile of the audience with who, when, why, what, where and how in mind, and without assuming prior knowledge of the product.[8]

Like Vermeulen, Morgan recommends starting any technical documentation project with a good template. He also discusses the layout of information and suggests the following:[9]

- For headings, use fonts contrasting with body text to ease navigation and create a visual impact.

- Use bullet points to break down instructions and include one command per bullet.

- Group related content in close physical proximity to establish a visual relationship.

With regards to language, Morgan is aligned with Vermeulen and recommends using the active voice but also recommends using verb nouns as headings because they are more concise and unambiguous, creating a command for the user. Finally, Morgan recommends building an editing checklist that is separate and not incorporated with proofreading.

Morgan recognises that often multiple authors work on a single document and this can lead to inconsistency. A technical authoring tool that allows multiple users to work on a document

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[6] Eveland cited in Crabbe, *Current practice and trends in technical and professional communication*, 37
[7] https://instrktiv.com/en/82079/
[8] Kieran Morgan, *Technical Writing Processes*, 41-49
[9] Ibid, 72

simultaneously is suggested to ensure consistency. However, Morgan acknowledges that this will require additional investment that some companies may be reluctant to spend.

Mark Achtelig's view is similar to that of Morgan and Vermeulen where he believes structuring is fundamental to successfully writing an effective user manual, as is creating a good template. He suggests using as few styles as possible and believes a formatted document motivates the writer and results in better content. He also advises against including information that will not add value to the user, such as company logo on every page.

According to Achtelig "good structure is even more important than good content. It doesn't matter how excellent your content is: if you have a poor structure, nobody will find and read this excellent content."[10]

The basic structuring rules according to Achtelig are:

- **Make it goal-centred** – tell the users what they want to know rather than what you want to say and set up a structure that reflects the user's goal rather than strictly following one that reflects how the product works. According to Achtelig, more than 90% of users are not interested in how a product works and most only refer to the manual when they hit a problem. The idea is to "provide assistance – don't provide documentation."[11]

- **Layer information** – provide the must know, should know and optional elements in the respective order. It is important to capture the reader's attention at the start of a topic with the main piece of information, as readers often assume what comes at the beginning is most important and they tend to remember that information better.

- **Split complex information** – break down information into easily digestible topics and steps, using lists, numbers and bullets in place of large chunks of text. Use numbered texts to write procedures and do not merge multiple actions into one step – one sentence for each step if possible and split procedures with 10+ steps.

The knowledge of the target reader should be given consideration according to Achtelig. This is because beginners will more likely want step-by-step instructions while advanced users often just want to look up a specific topic, so skimming and navigation is important to them. Good, appropriate headings that capture the reader's attention are fundamental to skimming. Achtelig recommends headings in bold, but body text should not be bold unless it is to support skimming. Headings should also be concise and meaningful to retain the user's interest. Distinct information or a keyword should be placed at the beginning of the heading and singular nouns should be used. No more than three levels of heading is suggested by Achtelig and you should avoid major headings at the bottom of the page. Achtelig further discourages using a heading multiple times. In particular, this can be problematic for online help systems, as the search function will present multiple results.

A repetitive structure is recommended by Achtelig because it makes content predictable and readers find it easier to find the information they need when content is predictable. To improve readability, Achtelig recommends the following:

- Use cross references and links sparingly as they interrupt the flow of reading and can mean important information is overlooked.[12]

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[10] Achtelig, 13
[11] Ibid, 17-19
[12] Ibid, 106-138

- If you choose to cross reference, make sure the two sections have at least one key word in common to give the reader certainty to keep reading.

- Avoid using parentheses unless stating units of measurements or referring to numbered callouts. Create a separate sentence for the parentheses remark if it is important.

- Avoid acronyms and abbreviations and write in full unless it is an already established acronym used in other related documents or in the user interface of a product.

Achtelig also covers how to present information on hazards and suggests the following:

- Compliance with the relevant standard like ISO 3864-2.

- Add a warning directly before the text and not after.

- Warnings that are independent of a procedure and apply to the product in general should be placed in a separate section at the beginning of the manual.

- Explain the consequences of ignoring a warning, as this can make the user take the warning more seriously.

- Keep warnings short, consistent in length and repeat if necessary.

- Avoid the use of contractions in warnings. Use 'Do not' instead of 'Don't'.

Achtelig stresses the importance of choosing fonts carefully. He recommends using a sans-serif font for digital manuals; for printed manuals, serif or sans-serif fonts can be used. He discourages using fonts with heavy lines as it makes the text look obtrusive. Likewise, he discourages fonts with very thin lines that can fade over time in printed manuals. Calligraphy fonts should also be avoided and where possible choose a font that supports the characters of the languages you may need to translate to. For manuals to be printed, care should be taken to select a font with the right height, as some size 10 fonts are 2.5mm in height, while others may only be 2.0mm. Where space is tight, he recommends trying a font with taller lowercase letters and for long headings, he recommends a narrow font. It is a case of finding the right balance between headings and body text with carefully chosen font and font sizes. When in doubt, Achtelig advises choosing a common font as readers find it more relaxing to read text with familiar lettering.[13]

With every choice made during the manual writing process, consistency is essential according to Achtelig. Key to consistency is a good template and style preferences list. Finally, Achtelig provides many tips for writing good-quality clear content, generally echoing what the standards and other experts say. In addition, he suggests the following:[14]

- Write as though you are talking to the reader directly using 'you' for consumer-facing manuals as this increases attention and avoids ambiguity.

- Avoid using the word 'please' to give commands, as it can imply something is optional.

- Use fair language and write in a gender-neutral way.

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[13] Ibid, 75
[14] Ibid, 99-106

Instructions and human psychology

It appears that a well-designed instruction manual is not all about how it is written and the layout and style, but the understanding of human psychology is also important. According to Ganier, a well-designed instruction manual will address complex interactions between the user, the product and the instructions themselves. To create such a manual, the psychology behind how people learn and interact must be taken into consideration[15]. Instruction manual designers and writers must understand who the target audience is and have prior knowledge of their abilities. They must also take into account the target audience's memory capacity as human beings can process and remember only so much information at once[16]. When designing the manual, the writer should strategically map out instructions to not overwhelm the user, so that they can absorb the information and turn it into action.

Challenges of writing instructions that work

There is no doubt that the success of an instruction manual with regards to how helpful it is to an end user, is dependent on how well it was designed. A white paper published by GfK in 2015 discusses five challenges related to designing manuals.[17]

Challenge 1 : People use instructions in different ways

A research paper by Schriver et al that examined the interactions of users with several consumer product manuals found four categories of how instructions are used or perceived.[18]

- 42% worked with product/device concurrently with instructions

- 23% read instructions before using product/device

- 19% learned by doing (and did not refer to the instructions)

- 17% referred to instructions when unsure, to correct a mistake or to confirm

Schriver's findings support the notion that there are two main approaches users can take to use and learn from instruction manuals. The first is a self-learning instructions-based approach, when users will move through the manual in a linear fashion by reading sections in sequential order. The second strategy is a task-based approach where users navigate the manual in a non-linear manner, searching, reading warnings and choosing the sections that suits their immediate need. A well-designed manual will work well for both approaches.[19]

Challenge 2: Communication and comprehension

Another challenge is to make sure that manuals relay information as intended. To do this, the designer needs to take into account several factors to ensure effective communication and comprehensibility is achieved. Layout consideration of every page needs to be given. In addition, consideration needs to be given to layout and delivery format, for example what information a user will see first when they receive the manual.

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[15] Ganier and Manning cited in GfK, 4-5
[16] Cowan, N, *What are the differences between longterm, short-term, and working memory?* Prog Brain Res. 169, (2008), 323–338.
[17] GfK, *How to design great product instructions – five challenges to overcome*, 2015
[18] Schriver et al cited in GfK, 2015
[19] GfK, 2015

The use of text and graphics can aid comprehension if used well in combination. Users have a restricted use of memory and can only process so much information at one time. For example, Miller's Law states that generally a human being can hold only "7 plus or minus 2" objects in working memory.[20] Therefore, the volume of information given to users at a time must be a serious consideration for the designer. Graphical images encourage easier processing of information by enabling the user to bypass the extra effort used by the brain to formulate a mental model of the task. When depending on text only, users need to form their own mental models based on their perception of the text and this increases the probability of error.[21]

Text presentation including the background colour can also affect readability and thus comprehension. A readable font can motivate the user to read. Fonts should be carefully chosen giving consideration to line thickness, size, curves, colour and letter spacing.[22]

Challenge 3: Turning knowledge into action

To turn knowledge into action, users must be able to comprehend the text and identify what is involved in the task and what is expected of them. With some products, knowledge only needs to be converted to action once, while with other products, this will need to be done repeatedly as part of constant use of the product. Instruction manual designers therefore need to appreciate that designing a manual for successful use over a prolonged period requires a different angle compared to helping users with a one-off task.[23]

Challenge 4: Keeping users engaged

A common first thought by a user when seeing a product manual is 'I don't have time for this'.[24] However, if a manual is designed to a good standard, it can actually save the user time. To convince the user that the manual is worthy of their time and attention, Keller's ARCS (Attention, Relevance, Confidence, Satisfaction) model for motivation below may be useful.[25]

- **Attention** – Designers should seek to gain the attention of the user visually so that they feel encouraged to read the manual.

- **Relevance** – The design should reflect the user aims relating to the product use. The language should be familiar.

- **Confidence** – The manual must encourage confidence in the manual's ability to give instruction and the user's own capability to accomplish the given task.

- **Satisfaction** – The manual needs to present an expectation that it will do a great job and then go on to meet this expectation through successful use of the product.

Challenge 5: Selecting the right medium(s)

Instruction manuals are presented in a number of formats: paper manuals, PDFs, as a hang-tag outside the product and sometimes on the actual surface of the product. The delivery

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[20] G. A. Miller, *The magical number seven, plus or minus two*, *Some limits on our capacity for processing information. Psychological Review*, (1956), 81–97
[21] GfK, 10-14
[22] Ibid
[23] Eiriksdottir & Catrambone cited in GfK, 2015
[24] GfK, 17-18
[25] https://www.arcsmodel.com/

format that will most help the user should be selected. Two common formats other than printable PDF versions are digital manuals and video instructions.[26]

Digital manuals

There are many ways in which digital instruction manuals can add to the instructional capacities of traditional manuals:

- Written text can also be spoken which some customers prefer, and will be of particular benefit to those customers with poor sight.

- Animated graphics as well as still graphics can be used and animations can present complicated procedures with greater clarity than images.

- Instructions can be presented on a screen with the added benefit of a navigational facility.

According to Novick and Ward however, while online help is more likely to be consulted than paper manuals, users are equally likely to solve problem by asking another person or by experimenting on their own.[27]

Video instructions

YouTube is now a very popular source of how-to video guides for a vast array of products and skills. According to GfK, a product's instruction video in respect of brand perception and product use can be designed with even more engagement.[28]

Summary of findings

Industry practices are strongly aligned with the standards, mainly IEC/IEEE 82709-1. Some additional recommendations are provided that instruction manual writers and designers may find useful. The human psychology elements can also contribute to the development of comprehensible manuals and possibly to motivate users to make use of instruction manuals.

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[26] GfK, 19
[27] David G Novick & Karen Ward, *Why don't people read the manual?,* (University of Texas, 2006)
[28] GfK, 19

Best practices

A set of best practices has been identified by The i-Team from this scoping study. These best practices are based on the standards, industry practices and recommendations and The i-Team's own experience and knowledge of working with a vast number of manufacturers to produce technical manuals over the last two decades. The manuals reviewed also contributed to the development of these practices. The manuals that met most review criteria were consulted for layout, use of symbols, structure and use of illustrations. Likewise, the poorly presented manuals were used to identify many of the do not dos.

The practices cover the following areas and full details of the proposed practices are included in Appendix F:

- Template

- Structure

- Format[29]

- Presentation and layout (general)

  o Headings

  o Paragraphs

  o Procedures and steps

  o Page numbers

  o Tables

  o Figures

  o Bullets and lists

  o Cross references and links

  o Colour perception considerations

  o Numbers and units

  o Translated sections

  o Presentation of safety information and warnings

  o Language

  o Graphics and illustrations

  o Font

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[29] The best practices proposed are predominantly for printable manuals as that is still the most common format. However, the majority of the best practices can be adopted for digital manuals and some can be adopted for video instructions, which require further exploration as part of a wider research project to understand consumer behaviour.

- Production

- Content to include

  o Product identification information

  o Manual identification

  o Purpose of instruction

  o Safety information

  o Product specifications

  o Installation

  o Operation

  o Maintenance information

  o Troubleshooting information

  o Supplier details

Barriers

The i-Team recognises that for companies to adopt best practices and even to comply with the existing standards, they will face some barriers. A well-produced manual is the outcome of a well-established documentation process, dedicated resource and careful selection of tools. Where this is not already the case in an organisation, it would require changing conventions and the writers of manuals within organisations usually do not have the authority to change such conventions. All the above will also require financial investments for which many companies do not have a budget.

To ensure that a new product is accompanied by a good instruction manual, the production of the manual needs to be scoped for at the start of the development process. However, as a technical authoring company with multiple clients, The i-Team is aware that the production of the manual usually takes place during the last stages of a project. The order in which companies do things will need changing, but to implement such changes it is likely that companies will need assistance from industry experts. The i-Team recommends an external certification process for manuals, prior to releasing them. How to implement this certification process will require further exploration.

There are also likely to be other barriers to change from an organisation's point of view that will need to be further explored, such as unwillingness of existing project members to change. This research should take place in conjunction with The i-Team's suggestions of extending this scoping study, in particular to understand consumer behaviour, so that a complete understanding of barriers from both company and consumer points of view is achieved.

Extending this scoping study

From this scoping study the need for additional research has become apparent. The i-Team's further research suggestions are a direct extension of this scoping study to continue exploring best practices in product manual writing.

The i-Team suggests the following:

- Researching consumer attitude and behaviour towards product manuals to understand their preferences with regards to style and format of manuals. The i-Team suggests the application of the identified best practices to at least one of the manuals reviewed to obtain feedback from consumers on both the new and original version. The aim would be to test the identified best practices to understand if its application leads to better engagement between the consumer and the manual and also to identify any possible barriers that affect consumer interaction with manuals.

- Researching barriers to change from an organisation's point of view. This research should take place in conjunction with the recommended study to understand consumer behaviour, so that a complete understanding of barriers from both company and consumer points of view is achieved.

- Researching and exploring styles and formats including videos of safety instructions. The aim would be to understand how safety instructions can be better presented in a more creative and easily digestible format.

- Examination of information included on the packaging of products or on the actual products and other associated literature to check if there is consistency between this information and the information in manuals. As consistency is key to ensuring effective and safe use of a product, The i-Team believes it is important to understand if there are sources beyond the instruction manual that consumers may turn to and obtain incorrect information.

Conclusion

Many conventions in the design and writing of instruction manuals have become apparent from this scoping study. Various standards and industry recommendations have been identified that may have contributed to the development of some of the manuals reviewed.

The review of the manuals, based on the standards and industry practices, found there to be differences in practices between companies with regards to styles and conventions used, but at the same time there are many common practices. Most companies use a similar style of manual for all products, and therefore produce a similar level of alignment with the review criteria. Price of the product appears to be no indicator of the quality of manuals, with some of the best manuals being provided for the cheaper products and some of the more expensive products being supplied with poorer manuals.

The most common format of manuals is an A5 non-colour printable version, text-based with some illustrations. Other versions such as large print, braille and audio files do not appear to be available.

Most products tend to be supplied with a single user manual, but some companies choose to separate out installation instructions into a further manual, often omitting safety information. The common practice with regard to different models appears to be one manual per model. Where multiple models are covered or there are variants of the model, information on the variations is often vague and not clearly presented.

Considerable variation was found in the length of manuals. On the whole, there seems to be a connection between the length of manuals and the degree of compliance with the IEC/IEEE 82709-1 standard. However, it should be noted that the manuals for one company are among the shortest and yet are highly compliant, proving that it is possible to be both brief and effective. Page numbering seems to be a common practice but not the use of glossary and index, both of which could improve usability and comprehension. Numbering sections is also not a common practice; this too could improve usability and facilitate skimming.

All the manuals include instructions on how to use the product to a sufficient level such that a typical user, with average knowledge of what the appliance does, will be able to follow the instructions and operate the product. However, some information that The i-Team considers critical safety information is missing; for example, although all manuals include warnings about the risk of fire, only one of the 25 manual sets provides details of how to deal with a fire. A small number of manuals also fail to provide electricity supply data and weight of the appliance. The exclusion of any information that can compromise consumer safety is a concern and could lead to serious consequences.

With regard to presentation, little creativity is apparent. Although many of the manuals reviewed do have a clear layout, with a sufficiently large font and good use of white space, there are still a significant number that suffer from a cramped, difficult-to-read layout and often the font size does not meet the international standard. Sometimes the order of information is not logical, which can make it difficult to find information and could cloud a user's perception of the manual. Again, the severe consequences of overlooking or misinterpreting information must be stressed as it can range from inefficient use of the product to accidents and injuries.

The quality of installation instructions varies. While some companies provide good, detailed instructions with accompanying illustrations, others rely entirely on diagrams. Some installation

instructions only cover specific aspects, such as changing the door to the other side, while some have no instructions at all. Correct installation is an essential part of ensuring that a product is safe to use and more importance needs to be applied to this aspect in the manuals.

The quality of safety instructions is of greater concern than any other sections of the manuals. Similar in look and feel between companies and product types, these consist, even in the best manuals reviewed, of many pages of dense, uninteresting text, often with only minimal headings and no apparent logical order to information. There is also a tendency to present safety information in a smaller font, with tight line spacing and very little white space, making it difficult to read and unattractive for users. Very few manuals use illustrations to improve the accessibility of the safety information, although illustrations are well used in other sections. As studies suggest that the human brain has the ability to process only a certain amount of information at a time, it is likely that the amount of content crammed into safety sections will be difficult for most users to digest.

Most manuals, with very few exceptions, provide additional warnings at appropriate points in the documentation and the warnings are generally conspicuous. The use of the standard symbols, however, is often patchy. Signal words (Caution, Warning, Danger) are usually not attached to the symbols and the symbols generally fail to meet the minimum 10mm height specified by the standard.

In general, while the companies cannot be faulted for the quantity of safety information they provide, they could do far more by way of illustrations, subheadings and improved layout to make this information more accessible and therefore more likely to be read and understood by users. However, it should be noted that the safety information is generally easy to find, being the first section in most of the manuals reviewed.

Unfortunately, it is probable that even the most carefully crafted and visually appealing manuals will not be consulted by many people. Evidence suggests that people use and perceive manuals in different ways; where some use them in a linear fashion, others use them in a non-linear way and some choose not to use them at all. To a certain extent, this is perhaps the result of appliances becoming more user-friendly; the more intuitive its dials and displays, the less the user will feel the need to consult the documentation and as a result the safety instructions may also get ignored.

There is also a growing tendency for people to turn to digital content for help, including videos that may not be company-approved, taking into consideration the volume of controlled and uncontrolled digital content available in the public domain. One way around this problem is for companies to consider making the manuals available both in traditional and in digital formats. An information card or a label attached to the product itself with information on alternative formats available could be provided.

However, the challenge of ensuring that safety information is noted by the consumer is likely to remain even if manuals are provided in alternative formats. How we can ensure safety information is well received and clearly understood will require further investigation. A few suggestions from The i-Team are to provide quick-start guides with important safety notes, or use good-quality illustrations with minimal text like the safety card in aircraft, as illustrations can help users form accurate mental models that reduce the probability of error. More research could allow an understanding of the psychology behind people's various degrees of interaction with instruction manuals and possibly lead to the development of a revised set of best practices and guidelines for creating effective instruction manuals that more people read. Until then, the best approach for companies is to continue making use of the available guides and

standards, in particular the IEC/IEEE 82079-1 standard, as well as following recommendations and industry practices.

A preliminary set of best practices derived from standards, guides and general industry recommendations is included in this report for review by OPSS with a view to taking it forward, although it is likely that these practices will need to be refined if this scoping study is extended and further research is carried out.

For companies to adopt proposed best practices, they will need to embrace changes in how they launch products and how they create and maintain product documentation. There are barriers to these changes, such as financial and psychological barriers. Further study in this area is required to understand and address barriers. Finally, The i-Team suggests extending this scoping study to further research some areas touched upon. In particular, the application of the identified best practices to one of the manuals reviewed could be helpful in order to understand how to make product manuals better engage with consumers.

Appendix A – Directives, standards and guides

Directives

The EMC Directive 2014/30/EU

The EMC Directive 2014/30/EU applies to electrical appliances. The directive specifies in detail the essential requirements a product has to meet in order for the manufacturer to affix the CE marking.

The purpose of this Directive is to make sure that equipment likely to produce or be influenced by electromagnetic disturbances can be utilised in the electromagnetic setting for which it has been created, without bringing about interference with other equipment or being affected by them.[30]

The Directive applies to goods sold as single working units to end users. The goods are either likely to produce electromagnetic interference or could have potential impaired performance because of it. The Directive does not apply to apparatus which is solely meant to be integrated into an established installation and is not otherwise available commercially.

Chapter 2, Article 7 of the Directive lists the obligations of the manufacturer of which one of them is that "Manufacturers shall ensure that the apparatus is accompanied by instructions and the information referred to in Article 18 in a language which can be easily understood by consumers and other end-users, as determined by the Member State concerned. Such instructions and information, as well as any labelling, shall be clear, understandable and intelligible."

Article 18 of the Directive stipulates as follows:[31]

- "Apparatus shall be accompanied by information on any specific precautions that must be taken when the apparatus is assembled, installed, maintained or used, in order to ensure that, when put into service, the apparatus is in conformity with the essential requirements set out in point 1 of Annex I."

- "Apparatus for which compliance with the essential requirements set out in point 1 of Annex I is not ensured in residential areas shall be accompanied by a clear indication of such restriction of use, where appropriate also on the packaging."

- "The information required to enable apparatus to be used in accordance with the intended purpose of the apparatus shall be included in the instructions accompanying the apparatus."

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[30] This 2014 Diredtive was a replacement for Directive 2004/108/EC, which previously governed this area.
[31] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0030#d1e1295-79-1

Regulation (EU) 2016/426

Regulation (EU) 2016/426 covers appliances burning gaseous fuels used for cooking, heating, hot water production, refrigeration, lighting or washing.

According to this regulation, for CE marking to be applied on gas appliances, it must be examined externally by a Notified Body. For this examination to take place, the required technical documentation must be made available to the Notified Body. This includes instructions for installation and usage of the appliance. The full set of documents required are detailed in Annex III of the regulation.

The Notified Body shall conduct an appraisal to check the compliance of a product and that product compliance is adequately supported by technical documentation.

After the appraisal, the Notified Body issues an EU-type certificate to confirm that the product meets the applicable standards. Once the production phase compliance appraisal has been completed, the manufacturer then formulates the Declaration of Conformity (DoC) to affirm that the product conforms to the appropriate regulations. The formation of the DoC is a legal responsibility. The CE marking will then be followed by its identification number.

Chapter 2 of Article 7 of the regulation details the requirements needed from the manufacturers and states that the provision of instruction manuals is one of these requirements.

According to the Directive:[32]

- "Manufacturers shall ensure that the appliance is accompanied by instructions and safety information in accordance with point 1.5 of Annex I, in a language which can be easily understood by consumers and other end-users, as determined by the Member State concerned. Such instructions and safety information, as well as any labelling, shall be clear, understandable and intelligible."

- "Manufacturers shall ensure that the fitting is accompanied by a copy of the EU declaration of conformity containing, inter alia, instructions for incorporation or assembly, adjustment, operation and maintenance in accordance with point 1.7 of Annex I, in a language which can be easily understood by appliance manufacturers, as determined by the Member State concerned."

The Ecodesign Directive (2009/125/EC)

The Ecodesign Directive (2009/125/EC)[33] outlines the ecodesign requirements and environmental limits that need to be met by manufacturers so that they can hold the CE marking.

Equipment which affects energy use, produce, transfer or measure energy and other products linked with energy such as windows, insulation equipment or specific products which use water come under Directive 2009/125/EC.

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[32] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016R0426
[33] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32009L0125

IEC/IEEE 82079-1:2019 standard

This standard provides general principles and detailed requirements for the design and formulation of information for use (instructions for use) that can assist users to install, operate and maintain a product safely and appropriately. The 2019 edition of the standard cancels and replaces the first edition IEC 82079-1:2012.

The standard applies to information for use that is to be provided electronically or as printed hard copies. The standard aims to provide guidance to individuals and organisations to develop information for use of the required quality.

The standard states that "information for use of products applies to phases of the product life cycle such as transport, assembly, installation, commissioning, operation, monitoring, troubleshooting, maintenance, repair, decommissioning, and disposal, and the appropriate tasks performed by skilled and unskilled persons."

According to the standard "A product can be a system, a service, goods, software, information, or a combination thereof."

The standard defines the purpose of the information for use and regards it as an important item for the safe and effective use of a product and also necessary to fulfil legal and regulatory obligations.

The information management process is discussed comprehensively within the standard and empirical methods for the evaluation of information for use are also described. The standard encourages the use of competent professionals to prepare information for use.

The standard further refers you to use additional guidelines and standards that can be used in conjunction to ensure the information for use is of the required quality.

Key principles and guidance

Some of the key principles and guidance from the standard are summarised below. The full standard can be licenced by organisations for usage from IEC/IEEE.

General principles (section 1-5)

- "Information for use is an integral part of the supported product and shall be given the same attention and importance as every other part of the product. If the information for use is defective (e.g. does not meet the requirements), the product as a whole is defective. Information for use shall be clearly and easily identifiable with the supported product."

- "Information for use shall be usable and relevant for the target audiences with respect to their expected tasks and goals."

- "Information for use shall promote the safe operation and maintenance of the supported product. Information for use contributes to reducing the risk of injury or illness to people or animals, and risks of damage, malfunction or inefficient operation of the product. However, information for use cannot compensate for design deficiencies or missing safety systems."

- "Information for use shall be developed, produced, and sustained using defined, repeatable processes. The use of repeatable processes facilitates planning, implementing, checking, correcting, and improving the information for use."

- "Information for use shall meet the target audiences' needs for information quality: completeness, minimalism, correctness, conciseness, consistency, comprehensibility, and accessibility."

Information management process (section 6)

- "The supplier shall implement information management processes for planning, designing, producing, and sustaining information for use. The information management process shall generate, obtain, confirm, transform, retain, retrieve, and disseminate information, as appropriate."

- "Editing should be performed by persons other than those involved in writing or translating the information for use. The source text should be reviewed for accuracy, consistency, and usability before it is translated. Translations should be reviewed for technical and linguistic accuracy and clarity by competent persons"

- "Evaluation of information for use of a consumer product should include an empirical effectiveness check. The empirical effectiveness check should involve not only skilled experts but also persons unfamiliar with the use of the supported product and its information for use.". Annex A of the standard describes several methods for empirical effectiveness checks.

Content of information for use (section 7)

- "The content of the information for use shall cover the needs of the target audiences for the safe, effective and efficient use of the product, applying the principle of minimalism."

- "Information for use shall contain a general description of the supported product so that the target audience can understand the essential functions of the product in the contexts in which it is intended to be used. The intended uses of products shall be clearly and unambiguously described, including the technical limits and conditions within which the product is intended to be used."

- "Safety-related restrictions concerning the use of the supported product shall be given in the information for use."

- "Information for use shall describe the intended use of the product and provide information that helps the target audiences avoid unacceptable safety risks, malfunction of or damage to the supported product, or inefficient operation. Information for use shall provide the target audiences with the necessary information to identify and avoid reasonably foreseeable misuse of the product."

- "Information for use shall provide information on disassembly, recycling or disposal of the product."

- Information for use according to the standard, in addition to the above should include the following information:

  - Product description

  - Product and supplier identification

- o Visuals of the products

- o Installation and commissioning instructions

- o Operation

- o Indications of faults and warning device signals

- o Modifications (if applicable)

- o Troubleshooting

- o Maintenance and repairs

- o Accessories and spares

- o Repackaging, transportation and storage

Structure of information for use (section 8)

- "Information for use shall be structured so as to enhance its usability and comprehensibility, with, as applicable, features allowing for easy search, convenient navigation, and unambiguous understanding of its contents."

- "Where general information for use is likely to be lengthy or complex, it shall be clearly divided into convenient parts, and shall have a consistent format."

- "Information for use should be separated into chapters or sections if there are distinctly different target audiences, for example, installers and repair technicians."

- "For printed information for use comprising multiple documents, the information on the front covers or spines shall make it easy to distinguish one document from another."

- "Where supplementary information is provided, it may be indicated on a prominent place of the information for use."

- "Information for use shall include elements that make it easy to navigate the contents."

Media and format of information for use (section 9)

- "The supplier shall set editorial style conventions for the format of information for use and for the media to be used. The supplier shall determine the media and format of the information for use according to the nature of the target audiences and based on their needs. The media and format shall allow easy access to information for use throughout the intended lifetime of the product."

- "When any part of the information for use is made available on the Internet, both the presentation and the necessary methods of navigation should conform to ISO/IEC 40500:2012."

- Fonts and symbols should be large and as clear as possible to ensure all users can read the text easily, including the elderly and visually impaired. Details of font sizes are included in Table 4 of the standard.

- Graphical symbols should be explained in the instructions for use and they should be of appropriate size and height. Minimum heights for safety signs and graphical symbols are listed in Table 4.

Professional competencies (section 10)

- "The creation of information for use shall be assigned to competent persons. Organizations should analyse their content creation process, identify the tasks to be performed to achieve the required results, evaluate the competencies which are needed to perform these tasks successfully, and designate the tasks and responsibilities to persons who cover these competencies. Responsibilities should be assigned to separate persons where the size of the organisation permits."

Other standards and guides

ISO/IEC Guide 71

The ISO/IEC Guide 71:2014 provides guidance to standards developers on addressing accessibility requirements. Many suppliers now provide online versions of product documentation and some even set up complete web portal systems with product documentation.

Issues of accessibility to and usability of systems have become more critical because of the increase in the diversity of user accessibility needs, for example children, older persons, persons with reduced abilities and persons with disabilities. People's accessibility needs vary significantly depending on their ability and it also changes throughout the course of their lives. Standards that include accessibility requirements can support development of systems that can be used by more users. Therefore, this Guide will be relevant to manufacturers and suppliers providing online documentation and help systems.

IEC 62507-1:2010

IEC 62507-1 specifies basic requirements for the identification of objects and products. The standard includes recommendations for human comprehensible identifiers such as identification numbers for referencing purpose. The standard can therefore be useful for suppliers to assign product identification numbers as well as technical documentation identification numbers.

IEC 61355-1:2008

This standard describes rules and guidelines for the classification and identification of document types.

IEC 62507: 2010

This standard specifies basic requirements for the identification of objects and products.

IEC 81346-1 and IEC 62023

These standards provide information on structuring that can be useful to produce effective structures for information for use.

ISO/IEC Guide 51

ISO/IEC Guide 51 provides details on risk management and safety related information that can be used to prepare safety sections of product documents.

Standards related to graphical symbols

A vast number of standards and guides are available for the usage of graphical symbols. These guides and standards are mainly relevant to the usage of graphical symbols on the products/equipment but the principles can be applied to the usage of graphical symbols within manuals.

Note: It was not within the scope of this study to review information placed on products and packaging. Only manuals were reviewed as part of this study.

ISO 7000 / IEC 60417 – Graphical symbols for use on equipment

This collection includes both ISO and IEC graphical symbols that can be placed on equipment to indicate how to use it correctly and safely. It includes symbols for all types of equipment, from cars and home entertainment products to earth-moving machinery. This standard can therefore be applicable to domestic appliances where graphical symbols need to be placed on the product itself and the principles can be applied to the usage of symbols in product manuals for consistency.

IEC 60617 – Graphical symbols for diagrams

IEC 60617 contains graphical symbols for use in electrotechnical diagrams. The following areas are covered:

- Conductors and connecting devices

- Basic passive components

- Semiconductors and electron tubes

- Production and conversion of electrical energy

- Switchgear, control gear and protective devices

- Measuring instruments, lamps and signalling devices

- Telecommunications transmission, switching and peripheral equipment

- Architectural and topographical installation plans and diagrams

- Binary logic elements

- Analogue and hybrid elements

This standard can therefore be relevant to product manuals where connectivity, conversion of electrical energy etc. is covered.

ISO 3864 – Safety colours and safety signs

ISO 3864 consists of two parts:

- Part 1: Design principles for safety signs in workplaces and public areas

- Part 2: Design principles for product safety labels

Part 1 is not relevant to domestic appliances. Part 2 is relevant to domestic appliances that require safety labels to be placed on the products themselves and the principles can be applied to the usage of symbols in product manuals for consistency.

ISO 7010

ISO 7010 includes language independent safety signs for usage in information for use.

ISO/IEC Guide 74

The ISO/IEC Guide 74 presents information on relevant international reference documents and standards to assist technical committees and designers to follow "best practice" when considering the need for a new graphical symbol for the following purposes:

- Public information

- Use in safety signs and product safety labels

- Use on equipment and products

The guide can therefore be relevant to the development of symbols for usage within product documentation.

ISO 17100

ISO 17100 provides information on how to manage document translations where the information for use is to be provided in multiple languages.

ISO/IEC/IEEE 26153

ISO/IEC/IEEE 26513 provides detailed requirements for review and test of information for users which can be used to improve the quality of the information for use.

ISO/IEC 26514

ISO/IEC 26514 provides information on target audience analysis in order to prepare information for use that is suitable for the target audience.

ISO/IEC 40500:2012

ISO/IEC 40500:2012 provides guidance and principles for publishing information on the internet which organisations providing electronic copies of information for use should refer to.

ISO 9241

ISO 9241-210:2010 provides requirements and recommendations for design principles of computer-based interactive systems. It is intended to be used by those managing design processes, and so that they understand how components of interactive systems can enhance human and system interaction. The standard again can be beneficial for the development of online documentation and help systems.

ISO 9000

ISO 9000 describes quality management terms and concepts that organisations can adopt for quality assurance throughout the information development process.

Appendix B – Samples

The samples selected for the review are detailed in the following spreadsheet:

Best practice in product manual writing_report_Appendix B_Samples.xlsx

Appendix C – Review criteria

The criteria selected for the review are detailed in the following spreadsheet:

Best practice in product manual writing_report_Appendix C_Review criteria.xlsx

Appendix D – Manual review data

The data from the review are given in full in the following spreadsheet:

Best practice in product manual writing_report_Appendix D_Manual review data.xlsx

Appendix E – Review findings

This appendix details the findings from reviewing the sample of manuals. Manuals for a total of 25 appliances were reviewed, covering five product categories. The review criteria are listed in Appendix B and the manual review data is contained in Appendix C.

Are the manuals found to be compliant with standards?

The review covered the manuals for 25 products from seven companies. Ten types of domestic appliance were considered and these were divided among the companies, as shown in Table E.1.

Table E.1: Products selected for review

Appliance group	Appliance type	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
Fridges & Freezers	Fridge		X		X			
Fridges & Freezers	Freezer	X						
Fridges & Freezers	Fridge-freezer			X		X		
Cooking Appliances	Hob		X		X			
Cooking Appliances	Oven	X				X		
Cooking Appliances	Microwave oven			X			X	
Dishwashers	Dishwasher	X	X	X	X			
Washing machines	Washing machine	X	X		X	X		
Washing machines	Washer-dryer		X	X				
Tumble dryers	Tumble dryer	X		X	X			X

The European standard for manuals is IEC/IEEE 82079-1. The manuals were reviewed against 104 criteria listed in the standard along with 38 additional criteria identified from literature review.

Table E.2 shows the number of criteria that were **not** met for each manual reviewed. Low scores indicate better alignment with the criteria.

Table E.2: Number of non-aligned criteria for each manual

Company/Product type	A2	A5	A7	A8	A10
IEC/IEEE 82079-1	27	29	29	26	28
Other criteria	6	7	8	8	7
TOTAL	33	36	37	34	35

Company/ Product type	B1	B4	B7	B8	B9
IEC/IEEE 82079-1	24	29	25	20	21
Other criteria	6	6	5	6	5
TOTAL	30	35	30	26	26

Company/ Product type	C3	C6	C7	C9	C10
IEC/IEEE 82079-1	28	24	21	18	15
Other criteria	5	7	6	4	3
TOTAL	33	31	27	22	18

Company/ Product type	D1	D4	D7	D8	D10
IEC/IEEE 82079-1	41	30	30	26	24
Other criteria	12	12	8	4	3
TOTAL	53	42	38	30	27

Company/ Product type	E3	E5	E8	F6	G10
IEC/IEEE 82079-1	20	19	17	29	29
Other criteria	3	5	5	11	9
TOTAL	23	24	22	40	38

These figures highlight the differences between manufacturers (Table E.3). They also show that some manufacturers use a similar style of manual for all products, and therefore produce similar scores, while others have very different styles between products, with resultant variation in scores.

Table E.3: Overall scores (non-aligned criteria) by company

	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
Min. score	33	26	18	27	22	40	38
Max. score	37	35	33	53	24	40	38
Ave. score	**35**	**29**	**26**	**38**	**23**	**40**	**38**

Preliminary information

Manual specification

Table E.4 summarises by company the format and general specification of the manuals reviewed. The results for each of the criteria is then explained in more detail.

The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.4: Manual specification criteria by company

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
1.1 Page format	A5	A5	Various	A4 (5 out of 7)	Various	A5	A5
1.2 Page layout	2 col	1-2 col	Various	1-3 col	1-2 col	1-2 col	1-2 col
1.3 Colour/B&W	B&W	B&W	B&W	B&W	B&W	B&W	B&W
1.4 Number of pages per product	16-49	59-113	32-65	9-67	16-20	19	35
1.5 Alternative formats	PDF	PDF	PDF	PDF	PDF	PDF	PDF
1.6 Large print available	No	No	No	No	No	No	No
1.7 Tool used	Word	Word	Word/ DP	Word	Word	Word	Word
1.8 Number of manuals per product	1-2	1	1-2	2-5	1	1	1
1.9 Number of models per manual set	1-3	1-4	1-6	1	1-2	1	1

Page format

The page format chosen for manuals has an impact on the readability of the instructions and how easy they are to handle. A5 manuals are generally more accessible than A4. Choosing a non-standard page format means that manuals reproduced on a standard A4 printer will have wasted space on each page.

Of the 44 manuals reviewed for the 25 products, 15 use an A5 format, 18 use A4 and the remaining 11 have formats that are mainly a variety of sizes between A4 and A5 (Tables E.5 and E.6).

While most companies are consistent in page size, those that choose something other than A4 or A5 tend to have different sizes for each product's manuals.

Table E.5: Number of manuals by page size per company

Page size	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G	Total
A5	8	5				1	1	**15**
A4				18				**18**
Other			6	2	3			**11**
TOTAL	**8**	**5**	**6**	**20**	**3**	**1**	**1**	**44**

Table E.6: Number of manuals by product type for each page size

Product category	A5	A4	Other	TOTAL
Fridge	2	4	1	**7**
Freezer			1	**1**
Fridge-freezer			1	**1**
Oven	3		2	**5**
Hob	1	1	1	**3**
Microwave Oven	1		1	**2**
Dishwasher	1	4		**5**
Washing machine	3	5	1	**9**
Washer-dryer			2	**2**
Tumble dryer	4	4	1	**9**
TOTAL	**15**	**18**	**11**	**44**

Page layout

Company A has a two-column layout in all its manuals. Most other companies have a mix of single and double columns within each manual. Typically, the Safety section is single-column and the rest two-column. Two manuals have two A5 pages side-by-side rather than double columns.

Colour/B&W

All manuals are printed entirely in black and white.

Number of pages per product

A count was made of the total number of non-blank pages in the manuals for each product; in 16 cases there was a single user manual for the product but the other 9 products were supplied with more than one manual. The total number of pages for a product varies

considerably, from 9 to 113. At one end of the scale, all the manuals for Company E are between 16 and 20 pages, while at the other end, for Company B the range is 59 to 113 pages. Inevitably, the amount of detail provided is much less for the smaller manuals.

On the whole, there is a strong relationship between the length of manuals and the degree of alignment with the criteria. The shorter manuals either omit some of the information regarded as essential by the IEC/IEEE 82079-1 standard or they are printed in a small font, with tight spacing, making them more difficult to read. However, it should be noted that the three manuals for Company E (own-brand products) are among the shortest (16-20 pages) and yet are also among the most compliant, proving that it is possible to be both brief and effectively informative.

Surprisingly, the average number of pages by product type does not seem to relate to the complexity of the product (Table E.7). For example, the fridge for Company B has an 84-page manual while the manual for the washing machine for the same company, with a complex set of programmable functions, has just 82. Obviously, with such a small sample, it is impossible to draw wider conclusions relating to the industry as a whole.

Table E.7: Number of pages by product type

Product category	Number of pages (total for each product)	Number of products sampled	Average pages per product	Total number of manuals for all products
Fridge	84, 11	2	48	**7**
Freezer	16	1	16	**1**
Fridge-freezer	56, 18	2	37	**1**
Oven	49, 16	2	33	**5**
Hob	59, 9	2	34	**3**
Microwave oven	32, 19	2	26	**2**
Dishwasher	24, 93, 55,13	4	46	**5**
Washing machine	39, 82, 67, 20	4	52	**9**
Washer-dryer	113, 65	2	89	**2**
Tumble dryer	24, 56, 54, 35	4	42	**9**
TOTAL	**1109**	**25**	**44**	**44**

Alternative formats

All manuals are available in PDF format. In most cases, they can be found on the company's website, although in some cases locating the manuals can be time-consuming. Two of the manuals could not be found on the official sites and had to be downloaded from a third-party site.

Large print available

The standard specifies that for the benefit of users who are visually impaired, large print versions of the manuals should be available, as well as other media, such as audio files or files suitable for braille readers.

None of the companies reviewed appear to make large-print versions of the manuals available in printed form. However, all the manuals can be downloaded as PDFs and the print size can be expanded on the screen.

Similarly, none of the companies' websites appeared to offer audio files or alternative formats.

Tool used

It is not possible to determine the tool used for producing most of the manuals. However, in all but three of the cases it is likely that they have been produced using Microsoft Word or a similar word processor, as the layout is simple and little effort has been made to create complex designs.

Company C has six manuals, two of which appear to have been produced using desktop publishing software. Company E has one manual produced using InDesign. Documents may take longer to lay out using this type of software but are generally easier to use.

Number of manuals per product

Four of the seven companies produce a single user manual for each product, containing all the information to install, operate and maintain the product. There is some variation for the other three companies:

- Company A has a separate installation manual for three of its five products.

- Company C provides an additional Quick Guide for one product. This guide is larger than A4 and has two pages of instructions for each of seven languages.

- Company D has a completely different approach, with between two and five documents for each product. The manuals typically include an installation guide, instructions for use, safety & health, product data sheet and product fiche. The location of installation information varies between products and is sometimes divided between manuals.

This is summarised in Table E.8.

Table E.8: Number of products for each type of manual set per company

Manual set	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G	Total
User manual	2	5	4		3	1	1	**16**
Installation + user manual	3							**3**
Multiple manuals			1	5				**6**
TOTAL	**5**	**5**	**5**	**5**	**3**	**1**	**1**	**25**

Number of models per manual

The majority of manuals (15 out of 25) are dedicated to a single model; another eight cover either two or three models; only two manuals cover more than three models. This is summarised in Table E.9.

Table E.9: Number of manuals for specific numbers of models covered by the manual (by company)

Number of models	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G	Total
1	2	3	1	5	2	1	1	**15**
2	1	1	2		1			**5**
3	2		1					**3**
4		1						**1**
6			1					**1**
TOTAL	**5**	**5**	**5**	**5**	**3**	**1**	**1**	**25**

There are also variants between models that are covered by the same manuals. The way in which the differences are handled is described later.

Product and document identification

Product details are generally included on the front page of manuals and most include a document identification number on the back page. However, none includes details of how to obtain updated documentation, and most do not include a publication date within the documentation.

Many of the manuals relate to multiple models and most models have variants and optional extras. There is no formal list of the difference between models or the variants and extras that are available; models, variants and extras are referenced within the text.

The manuals are all aimed at general users; none provides technical information for specialist repairers.

The IEC/IEEE 82079-1 standard states that manuals should include a prominent statement in the form 'Keep for future reference'. Only two manuals do this, although all manuals include such a statement somewhere in the body of the text.

Table E.10 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.10: Product and document identification by company

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
2.1 **Brand details**	Title page	Title page	Title page	Data sheet	Title page	In Tech Spec	Title page
2.2 **Variants**	1 of 5	1 of 5	5 of 5	2 of 5	None	None	None
2.3 **Optional extras**	2 of 5	4 of 5	1 of 5	2 of 5	None	None	None
2.4 **Version no.**	Back page	Title & back page	Back page	Data sheet or back page	Back page	Back page	Back page
2.5 **Date**	None	None	Every page	One product	Every page – one product	None	None
2.6 **Revisions**	None	None	None	None	None	None	None
2.7 **Target groups**	General users	General users	General users	General users	General users	General users	General users
2.8 **Keep for future reference**	Within text	Within text	Within text	Within text	Within text / Yes	Yes	Within text

Brand details

Most companies print the brand and model number on the title page.

However, Company D, with several manuals per product, only includes the model number on the product data sheet and product fiche. For this company, the other manuals include nothing that specifies the model to which they relate.

Company F includes the model number only in the table of technical specifications, near the back of the manual. There is a different product number on the title page.

Variants

Companies A, B, C and D have some variants within models for some of their products. None of them specify within the documentation what these variants are.

The other three companies have no variants within models.

Optional extras

Companies A, B, C and D have some optional extras for some of their products. None of them specifically states within the documentation what these extras are.

The other three companies have no optional extras.

Version no.

Almost all manuals have some form of document identification on the back page, although it is not generally stated to be a version number of the manual.

Some of Company D's manuals have no document identification number at all.

Date

Company C prints the date on every page of every manual, as does Company E for one product. Company D includes the date on the manuals for one product. In all other cases, no date is given.

Revisions

None of the manuals indicates the revision status of the manuals or states where revised manuals may be obtained.

Target groups

All the manuals reviewed are aimed at general users. None of them includes information for specialist repairers.

Keep for future reference

The IEC/IEEE 82079-1 standard states that manuals should include a prominent statement in the form 'Keep for future reference'. Only two manuals do this; the manuals for the other 23 products include a statement in normal type within the main body of text.

Company information

Most companies rely on their websites to provide contact details, customer service details, online help, registration benefits and warranty details, rather than including this information within the manuals.

Compliance with standards tends to be referenced rather than including statements of conformity. The majority of manuals have CE marks.

Table E.11 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.11: Company information

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
3.1 Contact details	Website	Back page or previous page	Website	Website or Italian address	Back page	Website	Phone nos.
3.2 Customer Service details	Website	Back page or previous page	Back page	Website	Back page	Website	Phone nos.
3.3 Online help details	Website	Website	Website	Website	Website	Website	Website
3.4 Website details	Yes	Yes	Yes	4 of 5 products	Yes	No	No
3.5 Registration details and benefits	Website	Website	Website	Website	Website	Website	Website
3.6 Warranty information	Website	Some info	Website	Website	Website	Full warranty	Some info
3.7 Conformity with standards	Refs; CE mark	Refs; most with CE mark	Mixed	Specified; some CE marks	No refs	Specified	Refs; CE mark

Contact details

Companies B and E provide full company details at the back of the manual. Company D provides an Italian address on some manuals. Company G provides phone numbers but no company address. In all other cases, users must go to the website for company contact information.

Customer service details

Companies B, C and E provide Customer Service details at the back of the manual. Company D provides an Italian address on some manuals. Company G provides phone numbers. In all other cases, uses must go to the website for Customer Service details.

Online help details

In all cases, online help is available on the website.

Website details

Companies F and G, and some Company D manuals, provide no link to the company website. In all other cases, the main web address is given.

Registration details and benefits

Registration details and benefits are provided on company websites but not within the manuals.

Warranty information

Company F includes a full guarantee in its manual. Companies B and G provide some warranty information. In most cases, full warranty information is available only via the website.

Conformity with standards

There is wide variation in the degree of conformance information given. Eight products include full compliance statements, 12 refer to standards and five have no references to standards. Sixteen out of 25 products have a CE mark.

Details of compliance for each company are given in Table E.12.

Table E.12: Numbers of products containing compliance information for each company

Compliance	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
Full compliance statement			2	5		1	
Standards referenced	4	5	2				1
No standards referenced	1		1		3		
CE marks	5	4	3	3			1
CE marks not included		1	2	2	3	1	

Manual content and structure

Product details

It would be surprising if manuals did not include a description of the appliance, its dials, settings and programmes. Almost all manuals include the information a user would expect to find, although there are some that are missing suitable diagrams and some that assume the user will have basic knowledge of the appliance's potential uses. However, the scope of this research does not cover instructions attached to the product itself, which could include operating instructions.

Table E.13 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.13: Product details (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
4.1 Components of the appliance	3 of 5	Yes	Yes	3 of 5	Yes	Yes	Yes
4.2 Functions and range of application	Yes	Yes	Yes	3 of 5	Yes	Yes	Yes
4.3 Intended use	Yes	Yes	Yes	3 of 5	Yes	Yes	Yes
4.4 Limits of application	Yes	Yes	Yes	3 of 5	Yes	Yes	Yes
4.5 Compliance with legal requirements	4 of 5	Yes	Yes	Yes	No	Yes	Yes
4.6 Dials/ settings	Yes	Yes	Yes	4 of 5	Yes	Yes	Yes
4.7 Displays/ lights/error messages	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4.8 Programmes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Components of the appliance

Most manuals provide a good diagram of the appliance but some manuals for Companies A and D do not include this information.

Functions and range of application

The functions and range of application for the appliance are well covered except for some of the limited documentation of Company D.

Intended use

The intended use of the appliance is well covered except for some of the Company D manuals.

Limits of application

The limits of application of the appliance are well covered except for some of the Company D manuals.

Compliance with legal requirements

Most manuals give information relating to compliance with legal requirements, the exceptions being one manual for Company A and all those for Company E.

Dials/settings

Apart from one Company D manual, all manuals provide a diagram of the appliance's dials and a description of its settings.

Displays/lights/error messages

All manuals provide details of displays, lights and error messages.

Programmes

All manuals provide details of programmes (where applicable).

Safety information

Safety information is generally comprehensive but often lengthy or complex, which could be off-putting to readers. The layout of safety information is often likely to discourage careful reading, as illustrated in the A4-page example in Figure E.1.

Figure E.1: Example of lengthy, complex safety information
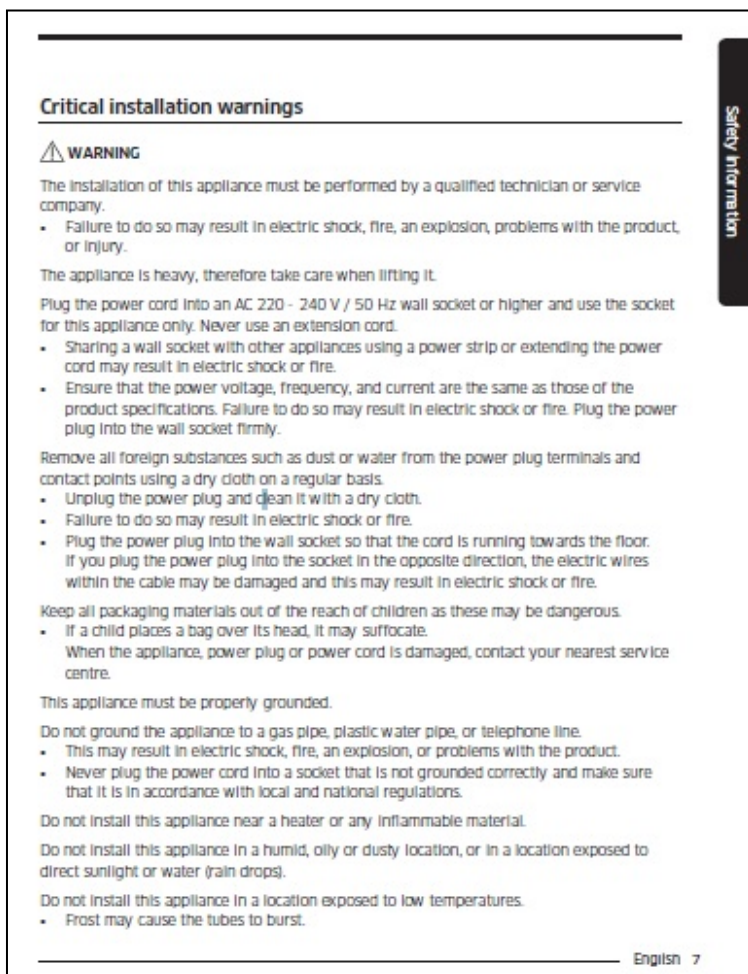
The use of standard symbols is patchy. They are generally poorly explained at the start of the manual and signal words (Caution, Warning, Danger) are not widely attached to the symbols.

Table E.14 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.14: Safety information (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
5.1 Location of main safety section	Front	Near front	Front	Sep doc	Front	Front	Front
5.2 Safe and correct use	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5.3 Restrictions on intended use	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5.4 Precautions	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5.5 Potential hazards and health risks	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5.6 Non-approved modifications	1 of 5	No	Yes	No	No	No	No
5.7 Access by vulnerable groups	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5.8 Poisoning/ irritation	No	3 of 4	1 of 2	1 of 2	No	n/a	n/a
5.9 Damage/ personal injury	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5.10 Electrical danger	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5.11 Risk of fire	Warning	Warning	Warning	Warning	Warning	Warning	Warning
5.12 Quality of safety information	Detailed	Detailed	Detailed	Detailed	Detailed	Detailed	Detailed

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
5.13 Accessibility of safety information and ease of use	Complex	Lengthy	Lengthy	Lengthy	Clear	Complex	Complex
5.14 Appropriate location of warnings	Yes	Yes	Yes	3 of 5	Yes	Limited	Yes
5.15 Warnings conspicuous	Yes	Boxed	Yes	4 of 5	Yes	Some	Yes
5.16 Standard symbols	Yes	Some	4 of 5 manuals	3 of 5 manuals	Some	Yes	Some
5.17 Symbols adequate size	No	1 of 4	No	No	Some	Yes	Yes
5.18 Symbols explained in text	Yes	No	Yes	3 of 5	No	No	No
5.19 Signal words	Yes	No	4 of 5	4 of 5	No	No	Yes
5.20 Inclusion in other guides	1 of 2	n/a	No	No	n/a	n/a	n/a

Location of main safety section

Most companies print safety information immediately after the Contents list. Company B provides safety information after the product description. Company D has a separate safety document.

Safe and correct use

Detailed safety instructions relating to safe and correct use are included in all manuals.

Restrictions on intended use

Detailed safety instructions relating to restrictions on intended use are included in all manuals.

Precautions

Detailed safety instructions relating to precautions are included in all manuals.

Potential hazards and health risks

Detailed safety instructions relating to potential hazards and health risks are included in all manuals.

Non-approved modifications

Company C provides instructions not to modify the equipment. Company A provides some warnings. All other companies give no information on the subject.

Access by vulnerable groups

All manuals include safety information relating to vulnerable groups, such as children, older persons, persons with disabilities or those with heart pacemakers or who suffer allergic reactions to specific chemicals. Much of the wording is identical between companies (as illustrated in Figure E.2), with Company B slightly rewording the safety information.

Figure E.2: Common safety information

- This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or those who lack experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.
Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning the use of the appliance in a safe way and understand the hazards involved.
- This appliance may be used by children between 3 and 8 years of age and persons with very extensive and complex disabilities, if they have been properly instructed.
- Children of less than 3 years of age should be kept away unless continuously supervised.
- Do not let children play with the appliance.
- Children shall not carry out cleaning and user maintenance of the appliance without supervision.

Poisoning/irritation

There is some information on the dangers of poisoning or irritation, where applicable, although Companies A and E omit this information.

Damage/personal injury

Detailed safety instructions relating to damage and personal injury are included in all manuals.

Electrical danger

Detailed safety instructions relating to electrical danger are included in all manuals.

Risk of fire

All manuals include warnings about the risk of fire but only one of the 25 products provides details of how to deal with a fire.

Quality of safety information

All manuals include detailed safety information. The information is generally good quality. However, there is a tendency for there to be far too much information, which makes it difficult for users to identify particular topics and is likely to result in the information not being properly digested.

Accessibility of safety information and ease of use

Although a great deal of safety information is provided, in most cases the information is poorly presented and lengthy, and often complex. Many manuals adopt a large font for the first set of safety information and then a much smaller font for the remainder. Frequently, there is very little white space and no attention is paid to where column and page breaks occur. The end result tends to be a solid block of seemingly impenetrable text, as illustrated in Figure E.3.

Figure E.3: Example of dense safety information

The exception is Company E (own-brand products), which provides reasonably clear, understandable safety information, as illustrated in Figure E.4. Even in this case, the language used could be made more accessible.

Figure E.4: Clear and understandable safety information

⚠ WARNING
- Keep ventilation openings in the unit enclosure or in the built-in structure clear of obstructions.
- Do not use mechanical devices or other means to accelerate the defrosting process, other than those recommended by the manufacturer.
- Do not use electrical appliances inside the food storage compartments of the unit, unless they are of the type recommended by the manufacturer.
- Do not damage the refrigerant circuit (The refrigerant is a very environmental-friendly gas but is also combustible. Take care when transporting or moving the unit to ensure that the refrigeration circuit is not damaged. In the event of damage avoid naked flames or ignition sources and ventilate the room in which the unit is placed for a few minutes.)
- When positioning the appliance, ensure the supply cord is not trapped or damaged.
- Do not locate multiple portable socket-outlets or portable power supplies at the rear of the appliance.

WARNING

⚠ IT IS HAZARDOUS FOR ANYONE OTHER THAN AUTHORISED SERVICE PERSONNEL TO CARRY OUT SERVICING OF REPAIRS WHICH INVOLVE THE REMOVAL OF COVERS.

⚡ TO AVOID THE RISK OF AN ELECTRICAL SHOCK DO NOT ATTEMPT REPAIRS YOURSELF.

Appropriate location of warnings

Most manuals, with very few exceptions, provide warnings at appropriate points in the documentation.

Warnings conspicuous

Warnings are generally conspicuous.

Standard symbols

All the manuals include at least some of the standard safety symbols.

Symbols adequate size

The symbols generally fail to meet the minimum 10mm height specified by the standard.

Symbols explained in text

Companies A and C provide an explanation of the symbols at the start of the safety information; Company D does this in some manuals. The other companies provide no explanation of the standard symbols.

Signal words

It is a requirement of the standard that safety symbols are accompanied by signal words (Danger, Warning or Caution). Companies A and G use the recommended signal words with the standard symbols; Companies C and D do so in some manuals. In all other cases, the signal words are omitted.

Inclusion in other guides

Company A repeats some of the safety information in other guides; Companies C and D do not repeat this safety information. The other companies have only one user manual.

Efficiency and energy saving

Most manuals include details of energy consumption and emissions and information on efficient use of the product, including tips for improved efficiency. However, a number of manuals omit some or all of this detail.

Table E.15 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.15: Efficiency and energy saving information (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
6.1 **Energy consumption**	4 of 5	3 of 5	4 of 5	4 of 5	Yes	Yes	Yes
6.2 **Emissions**	No	3 of 5	3 of 5	Yes	2 of 3	No	No
6.3 **Efficient use of product**	Yes	Yes	Yes	3 of 5	Yes	No	Yes
6.4 **Tips for improved efficiency**	Yes	Yes	Most	4 of 5	Yes	No	Yes

Energy consumption

All companies provide energy consumption information in at least some of their manuals but there are some manuals that omit this information.

Emissions

Company D provides full emissions data; Companies B, C and E provide emission data for some products; Companies A, F and G provide no emissions data.

Efficient use of product

Most companies provide information on efficient use of the product in at least some of their manuals but there are some manuals that omit this information.

Tips for improved efficiency

Most companies provide tips for improved efficiency in at least some of their manuals but there are some manuals that omit this information.

Installation

The quality of Installation instructions varies. While some companies provide good, detailed instructions with accompanying illustrations, others rely entirely on diagrams. Some installation instructions only cover specific aspects, such as changing the door to the other side, while some have no instructions at all.

The location of installation instructions is not always obvious. In a few instances, installation instructions are provided in a separate document and sometimes the instructions are provided as a series of diagrams, with no text. Where installation is covered in the main user manual, some of the instructions are at the end of the manual, rather than the front. In one case, the installation instructions form part of the safety information.

Not all manuals include performance data. Information on safe transport and handling is very limited, as are recommendations for storage. Unpacking the appliance and recycling of packaging is rarely covered.

Table E.16 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.16: Installation instructions (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
7.1 Technical specification	Yes (no weight)	3 of 5	4 of 5	Yes	Yes	Yes	Yes
7.2 Performance data	No	3 of 5	3 of 5	4 of 5	Yes	Yes	Yes
7.3 Transporting appliance	No	2 of 5	No	4 of 5	No	No	No
7.4 Storage	No	No	1 of 5	No	No	No	No
7.5 Unpacking	No	4 of 5	No	No	Yes	Yes	No
7.6 Safe disposal and recycling of packaging	Yes	Disposal only	Disposal only	Yes	Yes	Disposal only	Disposal only
7.7 Minimum space requirements	Yes	Yes	4 of 5	Yes	Yes	Yes	No
7.8 Product components	Yes	Most	3 of 5	No	Yes	Yes	No
7.9 Supply data	Yes	Yes	4 of 5	Yes	Yes	Yes	Yes
7.10 Installation instructions	4 of 5	Yes	Yes	Yes	Yes	Yes	Yes
7.11 Detachable parts	n/a	n/a	n/a	n/a	n/a	n/a	n/a
7.12 Installation of accessories	Yes	Yes	Yes	1 of 3	Yes	Yes	n/a
7.13 Connection to supply	2 of 5	Yes	4 of 5	Yes	Yes	Yes	Yes

Technical specifications

Most manuals include technical specifications although some do not include the weight of the appliance.

Performance data

Company A does not provide performance data. Most manuals for other companies include this data although there are some that do not.

Transporting appliance

Companies B and D provide some warnings that appliances should he handled by two people or that the appliance is heavy. None of the manuals provide advice on how to lift or move the appliance safely.

Storage

With the exception of one microwave manual, no information is given on storage requirements for appliances either before it is installed or if it has to be moved into temporary storage.

Unpacking

Companies E and F and some Company B manuals provide unpacking instructions; the other manuals assume the user will know how to unpack the appliance (or may include unpacking instructions on the outside of the appliance).

Safe disposal and recycling of packaging

Companies A, D and E provide advice on the safe disposal or recycling of packaging materials. The other four companies make no reference to these materials.

Minimum space requirements

Minimum space requirements are given for all appliances apart from that of Company G. However, in some cases these values are given in either the safety information or on data sheets, rather than within the installation instructions.

Product components

Most manuals include a list of the components that users should expect to find within the package but some omit this information.

Supply data

The manuals for two products fail to provide electricity supply data. For the other 23 products, supply data is provided for electricity, and water where appropriate.

Installation instructions

Three manuals contain no installation instructions. In all other cases, installation is included. For some of these, the instructions are included in a separate document. Some of the instructions are provided as a series of diagrams, with no text.

Where installation is covered in the main user manual, some of the instructions are at the end of the manual, rather than the front. In one case, the installation instructions form part of the safety information.

Some installation instructions only cover specific activities, such as changing the door to the other side, while some have no instructions at all. The quality of those installation instructions that are detailed and comprehensive is good.

Detachable parts

None of the products reviewed has detachable parts.

Installation of accessories

Company D has information on installing accessories for only one of the three products that include accessories. All other companies include installation instructions.

Connection to supply

Company A has instructions for connecting to the electricity and water supply for only two of its five appliances. Company C has no connection instructions for its fridge-freezer.

All other products include electricity and water supply instructions, although in some cases this information appears before the installation instructions.

Operation

Most manuals fulfil the majority of requirements of IEC 82079-1 with regard to operation of the appliance. However, there are some areas where the requirements tend not to be met:

- Half the manuals do not provide details of a suitable operating environment.

- Less than half the manuals provide information on dealing with power failures and other emergency stops.

- Some of the manuals provide information relating to different models or model variants in a vague way.

Table E.17 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.17: Operating instructions within manuals (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
8.1 Operating environment	No	2 of 5	4 of 5	2 of 5	Yes	No	Yes
8.2 Pre-use checks	Yes	Yes	Yes	Yes	Yes	No	Yes
8.3 Initial preparations	Yes	Yes	Yes	Yes	Yes	No	Yes
8.4 Operating instructions	Yes	Yes	Yes	4 of 5	Yes	Yes	Yes
8.5 Programme selection	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
8.6 Manual & automatic operation	Manual only	Manual only	Manual only	Manual only	Manual only	Manual only	Manual only
8.7 Starting and stopping	Yes	Yes	Yes	4 of 5	Yes	Yes	Yes
8.8 Interrupting operation	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8.9 Emergency stops	No	3 of 5	3 of 5	3 of 5	No	No	No
8.10 Warning messages	Yes	Yes	Yes	Yes	n/a	n/a	n/a
8.11 Fault messages	Yes	Yes	Yes	Yes	n/a	n/a	n/a
8.12 Managing faults	Yes	Yes	Yes	Yes	No	Yes	Yes
8.13 After-use operations	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8.14 Using accessories	Yes	Yes	Yes	2 of 3	Yes	Yes	n/a
8.15 Consumables	Yes	Yes	Yes	Yes	n/a	n/a	n/a
8.16 Instructions for variants	Vague	Within sections	Within sections	Vague	n/a	n/a	n/a
8.17 Supplementary information	None	None	None	None	None	None	None

Operating environment

About half the manuals reviewed include details of the operating environment required for the appliance. Companies E and G provide this information; Companies B, C and D include these details in some manuals; Companies A and F make no mention of the operating environment.

Pre-use checks

With a few exceptions (some manuals for Company D and the manual for Company F), the documentation includes details of the checks and operations that should be carried out before first use.

Initial preparations

Similarly, with a few exceptions (some manuals for Company D and the manual for Company F), the documentation includes details of the initial preparations to be made each time the appliance is used (where applicable).

Operating instructions

Apart from Company D's fridge, all manuals contain adequate operating instructions.

Programme selection

The manuals for all appliances that include programmes have descriptions of the programmes and their uses.

Manual & automatic operation

Company C allows remote operation of some of its appliances via a mobile phone app, and this type of operation is covered in the relevant manuals. In all other cases, the appliances do not allow remote or automatic operation.

Starting and stopping

Apart from Company D's fridge, all manuals contain instructions on starting and stopping the appliance.

Interrupting operation

All manuals include instructions for interrupting the operation of the appliance, where applicable.

Emergency stops

Only 10 of the 25 manuals include operations for dealing with power failure or instructions for restarting the appliance.

Warning messages

All manuals include explanations of warning messages, where applicable.

Fault messages

All manuals include explanations of fault messages, where applicable.

Managing faults

Company E provides no information on fault management; all other companies include the management of at least some faults in their manuals.

After-use operations

All manuals include descriptions of the operations that need to be taken after the application has been used.

Using accessories

With the exception of Company D's fridge, all manuals contain adequate instructions relating to accessories supplied with the appliance.

Consumables

The manuals for all appliances that require the use of consumables include information about the use of those consumables.

Instructions for variants

Ten of the 25 manuals relate to multiple models; nine manuals include information for model variants. In all, 13 of the 25 manuals include information relating to differences between models or variants of models, as shown in Table E.18.

Three of the manuals that cover multiple models or variants have no special instructions for those variations.

The manuals for Companies B and C generally deal with variations by including clearly-labelled subsections within those sections where there are differences; in some cases, there are separate sections for specific models that have additional functionality.

The manuals for Companies A and D include information about product variations within the text but these are identified by vague statements such as 'if available' and 'selected models only'.

Table E.18: Number of models and coverage of variants for each manual set

Company/Product type	A2	A5	A7	A8	A10
Models	2	3	1	1	3
Variants	No	Yes	No	No	No
Instructions for variants	None	Vague	n/a	n/a	None

Company/ Product type	B1	B4	B7	B8	B9
Models	1	2	4	1	1
Variants	No	No	Yes	No	No
Instructions for variants	n/a	Separate sections	Separate sections	n/a	n/a

Company/ Product type	C3	C6	C7	C9	C10
Models	2	1	3	2	6
Variants	Yes	Yes	Yes	Yes	Yes
Instructions for variants	Separate sections	Separate sections	Separate sections	Separate sections	Separate sections

Company/ Product type	D1	D4	D7	D8	D10
Models	1	1	1	1	1
Variants	No	No	No	Yes	Yes
Instructions for variants	n/a	n/a	n/a	Vague	Vague

Company/ Product type	E3	E5	E8	F6	G10
Models	1	2	1	1	1
Variants	No	No	No	No	No
Instructions for variants	n/a	None	n/a	n/a	n/a

Supplementary information

None of the manuals includes references to supplementary information (for example, editions in braille or using recorded media).

Cleaning and maintenance

Cleaning instructions are well covered in most manuals.

User maintenance is covered by some manufacturers but not all. However, there is very little information about maintenance and repairs that should be carried out by skilled people and very few manuals provide detailed information about spare parts. Most manuals provide good troubleshooting guides.

The majority of manuals do not provide warnings against disassembly of appliances. All manuals provide information about the correct disposal of appliances at the end of life.

Table E.19 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.19: Cleaning and maintenance instructions within manuals (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
9.1 Regular cleaning activities	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9.2 Regular maintenance	One model	Yes/ None	Yes/ None	Yes/ None	1 of 3	No	No
9.3 User repairs/ replacement	No	None	Yes/ None	None	Yes	No	No
9.4 Skilled repairs/ replacement	No	No detail	No detail	No	No	Yes	No
9.5 Trouble-shooting	Yes	Yes	Yes	3 of 5	No	Yes	Yes
9.6 Spares	On website	No	No	2 of 5	Yes/on website	On website	Phone no.
9.7 Disassembly	No mention	No mention	Advised against	No mention	No mention	Advised against	No mention
9.8 Recycling	None	None	None	None	None	None	None
9.9 Disposal	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Regular cleaning activities

All manuals provide information on regular cleaning activities.

Regular maintenance

Some appliances require no regular maintenance. For those appliances that may require maintenance, half the manuals include maintenance instructions.

User repairs/replacements

Where user repairs are feasible, Companies C and E provide instructions. Companies A, F and G provide no information relating to user repairs and replacements.

Skilled repairs/replacements

Company F provides information in its manual about repairs or replacements to be performed by skilled service people. Other companies either make no mention of skilled repairs or state that repairs must be performed by skilled people but provide no detail of how the repairs should be carried out. None of the providers appears to have separate documentation readily available for skilled repairers.

Troubleshooting

Most companies provide detailed troubleshooting guides. Company D provides these guides only in some manuals and Company E has no troubleshooting information in its manuals.

Spares

Spare parts are not generally covered by the manuals. Three manuals provide details of spares available; one manual provides phone numbers for spare parts; all other manuals either make no reference to spares or direct the user to the website.

Disassembly

Companies C and F warn against disassembling the appliances; the other companies make no mention of disassembly or provide warnings.

Recycling

None of the appliances are suitable for recycling by users, so there is no recycling information in the manuals.

Disposal

All manuals provide standard information about disposal of appliances at end of life. There are two main formats for this information and the wording is similar between manufacturers in each case.

Translations

Only three documents have multiple languages. In these cases, the languages are clearly identified and the organisation of the languages is appropriate for the location.

Some manuals are clearly translated from other languages and would benefit from light editing.

Table E.20 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.20: Translations in manuals (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
10.1 Single language or multi-language manuals	Single for user manuals, multiple for some installation guides	Single	Single	Single for most manuals, multiple for 1 safety guide	Single	Single	Single
10.2 No. languages	1 (user manuals), 30 or 34 (installation)	1	1	1 (most manuals), 4 (safety guide)	1	1	1
10.3 First language in the manual	English or Bulgarian	English	English	English or Arabic	English	English	English
10.4 Tool used for translation	Not known	n/a	n/a	Not known	n/a	n/a	n/a
10.5 Organisation of languages	Multiple per section	n/a	n/a	Sep sections	n/a	n/a	n/a
10.6 Illustrations and diagram text translated	No text on illustrations	n/a	n/a	No illustrations	n/a	n/a	n/a
10.7 Clear identification of languages	Yes	n/a	n/a	Yes	n/a	n/a	n/a

Single language or multi-language manuals

Company A has two installation languages that have multiple languages. Company D has one manual that has multiple languages in the safety document.

All other manuals are solely in English.

No. languages

The Company A multi-language installation manuals have 30 and 34 languages.

The Company D multi-language safety document has four languages.

All other manuals have a single language.

First language in the manual

For Company A the multi-language documents start with Bulgarian.

The first language in Company D multi-language documents is Arabic.

All other manuals are in English.

Tool used for translation

Where translations are used the translation tool cannot be identified.

Organisation of languages

For the multi-language manuals, there are either multiple languages in each section or separate sections for each language. In all cases the organisation is appropriate for the type of translations and their location.

Illustrations and diagram text translated

The multi-language manuals either have no illustrations or illustrations with no language-dependent text.

Clear identification of languages

For the multi-language manuals, the languages are clearly identified.

Document style

Navigation options

With the exception of three manuals, all other manuals include a detailed Contents list.

No manuals include an Index and only one has a Glossary.

Page numbers and headings are well used but only one company numbers its headings.

The order of sections is generally logical but there is a tendency for the installation instructions to be placed in inappropriate places. Some other sections are not always where they might be expected to be. For example, one microwave oven manual provides basic cooking instructions only after descriptions of how to use various special functions.

Table E.21 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.21: Navigation options within manuals (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
11.1 Contents	Yes	Yes	Yes	2 of 5	Yes	Yes	Yes
11.2 Index	No	No	No	No	No	No	No
11.3 Glossary	No	No	One	No	No	No	No
11.4 Page numbers	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11.5 Section numbers	Yes	No	No	No	No	No	No
11.6 Logical order of sections	Some illogical order	Confusing	Some illogical order	Some illogical order	Some illogical order	Some illogical order	Some illogical order

Contents

With the exception of three Company D manuals, all other manuals provide a detailed Contents list, which is the main navigation tool.

Index

None of the manuals include an Index, so users must look at the Contents list to find information. However, particular topics are not always obvious within the Contents.

Glossary

Glossaries provide a quick reference to technical terms within the manuals. Only one manual includes a Glossary, Company C's dishwasher manual.

Page numbers

All manuals have clear, logical page numbers.

Section numbers

Section numbers aid navigation. Company A has numbered sections; all other manuals do not use section numbers.

Logical order of sections

The sections in 11 of the 25 manual sets follow a logical order.

The most common confusion comes from the location of the installation instructions. In nine manuals the installation instructions are either near the end of the manual or appear in the safety information.

Other sections appear in unexpected places in 11 of the manual sets.

Illustrations and tables

Illustrations are generally clear and well positioned and contain an appropriate level of detail. Some manuals benefit from additional shading and one company includes photographs, which are beneficial.

With a few exceptions, tables are clearly laid out and easy to use. Table E.22 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.22: Quality of illustrations and tables (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
12.1 Format of illustrations	Line drawings	Shaded line drawings	Line drawings some photos	Shaded line drawings	Line drawings	Line drawings	Line drawings
12.2 Quantity of illustrations	Good	Good	Good	Good	Good	Good	Good
12.3 Labelling of illustrations	Good	Good	Good	Good	Good	Some errors	Good
12.4 Single objective for illustrations	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12.5 Captions	None	None	None	None	None	None	None
12.6 Illustrations of appropriate type	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12.7 Clear tables	Some con-fusing	Yes	Yes	Yes	Yes	Yes	Yes
12.8 Ease of use	Mostly clear	Yes	Yes	Yes	Yes	Yes	Yes
12.9 Illustrations and tables related to text	Adjacent	Adjacent	Adjacent	Adjacent	Adjacent	Adjacent	Adjacent
12.10 Illustrations and tables repeated where necessary	No repeats	Some repeats	No repeats	No repeats	No repeats	No repeats	No repeats

Format of illustrations

All manuals reviewed use line drawings. Companies B and D use shading in their drawings, which improves clarity. Company C's dishwasher manual includes some photographs, which are beneficial.

Quantity of illustrations

All manuals reviewed include sufficient illustrations.

Labelling of illustrations

The labelling of illustrations is generally good. The Company F manual includes some errors in the labels.

Single objective for illustrations

The objective of illustrations is clear in all manuals and all illustrate a single objective.

Captions

None of the manuals includes captions for their illustrations. The use of captions would not improve clarity.

Illustrations of appropriate type

All illustrations are appropriate for their context.

Clear tables

Company A has some tables that are confusing but in all other cases tables are clear.

Ease of use

Apart from a few confusing tables for Company A, the tables in all manuals are easy to understand and use.

Illustrations and tables related to text

Illustrations are adjacent to relevant text in all cases and tables appear in appropriate positions.

Illustrations and tables repeated where necessary

There are few repeats of illustrations but where they are repeated this is beneficial. No tables are repeated.

Presentation and creativity

Half the manuals use text of the recommended size or larger while the other half include at least some text that is smaller than the 10-point recommended. This is particularly prevalent in the safety sections.

Ten manuals are clearly presented, with good line length and line spacing and a sensible use of white space. The other 15 manuals suffer from long lines, tight line spacing or a poor use of white space.

There are few additional symbols or presentation conventions and where these are used, they tend not to be explained.

Table E.23 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.23: Presentation and creativity (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
13.1 Meaningful headings	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13.2 Size of font, general	8.5	10	7.5, 8 or 10	8.5, 9 or 12	13	6.5 - 11	9
13.3 Line length and spacing	Good length, tight spacing	Good	Long lines, good spacing	Some good, some poor	Good	Some long lines, dense text	Good length, tight spacing
13.4 Contrast with background	Clear	Clear	Clear	Clear	Clear	Clear	Clear
13.5 Effective use of white space	No white space	Not always well used	Good	Some good, some poor	Good	Good	Poorly used
13.6 Size of font for safety information	13, 8.5	10 or 12	13, 10, 7.5	13 or 13.5	9	16, 6.5	13, 8.5
13.7 Symbols and icons	Two	None	Many	None	One	None	Two
13.8 Presentation conventions explained	No convs.	Some bold text	No convs.	No convs.	No convs.	Some bold text	No convs.

Meaningful headings

All headings are meaningful and appropriate.

Size of font, general

IEC/IEEE 82079-1 recommends that a 10-point font should be used for continuous text as a minimum.

Various sizes of font are used but only 12 of the 25 manual sets use a minimum of 10-point text throughout. Some manuals use a font as small as 6.5 or 7.5.

Line length and spacing

All but four of the manuals have line lengths that are easily read.

Ten of the manuals have poor line spacing in places, resulting in text that is cramped and difficult to read.

Contrast with background

All manuals are produced with black text on a white background and therefore have good contrast.

Effective use of white space

Of the 25 manuals, 13 use white space well, adding to the legibility of the text. Five manuals have much white space but this is poorly used and usually appears only at the ends of sections. Seven manuals have no white space, resulting in difficult-to-read documentation.

Size of font for safety information

IEC/IEEE 82079-1 recommends that a 10-point font should be used for text in safety sections as a minimum.

Various sizes of font are used but only 13 of the 25 manual sets use a minimum of 10-point text throughout the safety sections.

Three manuals use a 9-point font for safety information.

The other nine manuals have the first part of the safety information in fonts between 13 and 16 point but then use fonts between 6.5 and 8.5 point for the bulk of the safety sections.

Symbols and icons

Companies A, E and G use either one or two symbols in addition to the standard warning symbols but these are not always explained in the text.

Company C uses a large number of symbols and although these are defined at the start of the manual, the quantity of symbols does not add to the clarity of the instructions.

The other three companies do not define or use additional symbols.

Presentation conventions explained

Companies B and F use bold text occasionally but the reason for this is not explained.

Otherwise, there are no presentation conventions in the manuals.

Style and quality of text

Text is generally good, easy to understand and uses active voice. All text was found to be respectful (that is, it does not use prejudiced or patronising expressions and it does not make assumptions or use stereotypes relating to older people, people with disabilities etc.)

Some manuals use US spellings and several manuals are obvious translations that use unexpected words and phrases.

Spelling, punctuation and grammar are mainly good, with only a few occasions of poor grammar or other errors.

There is little unnecessary or repeated information.

Information and terminology is consistent but there are incidents of unexplained terms. All manuals use SI units.

Most manuals provide links to the company websites.

Table E.24 summarises the results of this part of the review by company. The numbers in the left-hand column relate to the criterion reference numbers given in Appendix C, which includes additional explanation of the criteria.

Table E.24: Features of text in manuals (by company)

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
14.1 Language used	Mostly UK English	UK English	US English	Mostly UK English	UK English	UK English	UK English
14.2 Complexity and style of language	Poor translation	Good	Some poor translation	Some poor translation	Good	Good	Poor translation
14.3 Ease of under-standing	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14.4 Numbered steps	Yes	None	Yes	Yes	Yes	Over-used	Yes
14.5 Active voice	Some active voice	Yes	Some active voice	Some active voice	Yes	Yes	Yes
14.6 Respectful text	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14.7 Spelling, punctuation and grammar	Some poor grammar	Good	Some errors	Good	Good	Good	Some poor grammar
14.8 Consistency of information	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14.9 Consistency of terminology	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Criteria	Co. A	Co. B	Co. C	Co. D	Co. E	Co. F	Co. G
14.10 Technical terms explained	No	Some unexplained	Common terms	Some unexplained	Common terms	No	Common terms
14.11 Units of measurement	SI	SI	SI	SI	SI	SI	SI
14.12 Ease of finding information	Good	Via Contents	Via Contents	Not always obvious	Good	Not always obvious	Good
14.13 Links/web address	Yes	Yes	Yes	3 of 5	Yes	No	No
14.14 No unnecessary detail	None	None	None	Some repeats	None	Some repeats	None
14.15 Consistent use of colour	No colour	No colour	No colour	No colour	No colour	No colour	No colour
14.16 Colours suitable for B&W printing	Yes	Yes	Yes	Yes	Yes	Yes	Yes

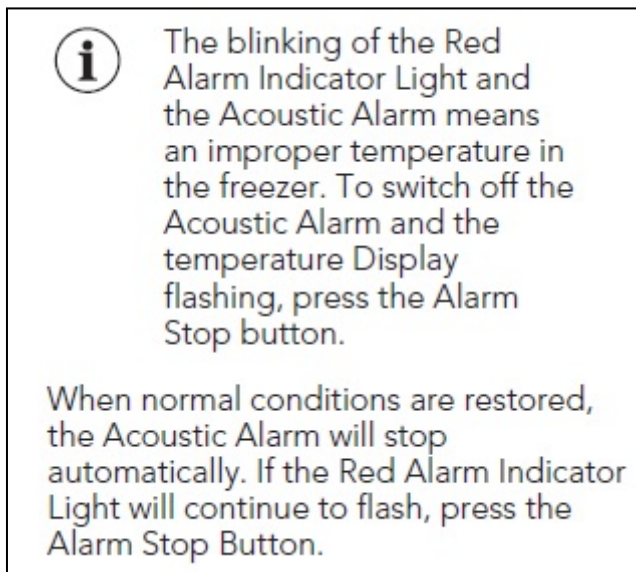## Language used

Most manuals use UK English. However, the Company C manuals use US spellings, as do two other manuals.

Complexity and style of language

Companies B, E and F use language that has good style and is simple to understand. The other manuals include at least some text that appears to have been translated from another language and is not always a good translation. An example is shown in Figure E.5.

Figure E.5: Example of poor translation

The blinking of the Red Alarm Indicator Light and the Acoustic Alarm means an improper temperature in the freezer. To switch off the Acoustic Alarm and the temperature Display flashing, press the Alarm Stop button.

When normal conditions are restored, the Acoustic Alarm will stop automatically. If the Red Alarm Indicator Light will continue to flash, press the Alarm Stop Button.

Ease of understanding

All manuals are easy to understand, even if the language is sometimes unconventional.

Numbered steps

Most manuals use numbered steps well. Company B does not use numbering, preferring instead to use bullets. Company F overuses numbering, with lists that would be better served by bullets.

Active voice

The use of active voice makes instructions easier to understand. Most manuals use active voice throughout but some have text that could be improved.

Respectful text

All manuals use text that is respectful. Respectful text is defined as text that does not use prejudiced or patronising expressions and does not make assumptions or use stereotypes relating to older people, people with disabilities etc. No examples of disrespectful text were found.

Spelling, punctuation and grammar

Most manuals have excellent spelling, punctuation and grammar but the manuals of Companies A, C and G include some grammatical and other errors.

Consistency of information

Information is consistent in all manuals.

Consistency of terminology

Terminology is consistent in all manuals.

Technical terms explained

Companies C, E and G use only terms that are commonly understood. The manuals of the other companies use some terms that are not explained in the text.

Units of measurement

All manuals use SI units.

Ease of finding information

Information is generally easy to find but in some cases the illogical order of sections means that information can only be found by reference to the Contents list and in some cases the location of information is not obvious even after referring to the Contents list.

Further information links/web address

Most manuals provide links to the company website but no links are given by Companies F and G and in some of Company D's manuals.

No unnecessary detail

Generally, there is no unnecessary detail in the manuals but some of the manuals for Companies D and F repeat information unnecessarily.

Consistent use of colour

None of the manuals uses colour.

Colours suitable for B&W printing

As all manuals are purely black and white, they are all suitable for black and white printing.

Appendix F - Identified best practices

Template

- Set up a template with the correct settings and styles.

- Include a front page and back page.

- Include an automated table of contents for manuals that are more than four pages.

- Have as few styles as possible within the template to make it writer friendly.

- Set up different levels of headings and fix the style.

- Make sure each level of heading differs in size by at least two points to create a hierarchy of headings.[34]

- Set the margins to create adequate line length of 40 to 70 characters or 8 to 12 words.[35]

- Use a consistent line width for illustrations.

- Align all content and objects using a design grid.

- Automate line breaks and page breaks.

- Provide separate paragraph styles for lists and numberings.

Do not do the following when setting the template:

- Use background images.

- Include the company logo on every page.

- Include the author's name on every page.

- Include the copyright notice on every page.

- Include the revision number and release date on every page.

- Include the document title on each page.

- Use extra-wide tables.

- Use empty paragraphs (blank lines).

- Use multiple space characters that create extra gaps between words and lines.

- Use tabs at the start of paragraphs to indent content.

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[34] You may need to use at least three points for certain fonts.

[35] If lines are too short, this slows down the reader; if lines are too long readers have to move their head to read, which also doesn't work well. Translated words can be longer so 7-12 words should be considered. Use the upper limit for serif fonts or if readers are well trained at reading or the text includes lengthy paragraphs.

Structure

- Divide the manual into convenient and consistent parts.

- The structure should support the correct use of the product in the correct order. For example, installation should be covered before operation.

- If the instructions are made up of more than one document, combine them in a systemised order, so that it is easy to follow; for example, cover installation first, then operation, then maintenance.

- Include safety information at the beginning of the manual. Make it the first major section after preliminary information and table of contents.

- Use different sections for each product model or variant if the differences are substantial. Use separate paragraphs or subsections for each model or variant if the differences are minor. Clearly identify the variant or model. If there are substantial differences between models throughout the manual, then it is better to produce separate manuals and repeat common text between them.

- Place optional modules and extras in separate sections.

- Keep maintenance information separate from installation and operation either in a separate section or as a separate manual.

- Split each section into a series of small steps for the user to follow.

- Cover basic functions before complex functions; for example, how to switch a product on/off before configurations.

- Layer information in each section starting with the must know, should know and then the optional elements.

- Repeat the structure in each section (be parallel) to improve usability of the document.[36]

- Where applicable, place the table of contents at the start, before any of the content and after the front page.

- Include all the headings and index in the table of contents.

- For manuals that are 16 pages of more or those of products with much technical terminology, include an index in alphabetical order.

- For complex products with many technical terms, include a glossary and list of acronyms.

- Provide translated information separately rather than include multiple languages on each page. Use standard two-letter abbreviations to identify languages clearly.

- Include manual identification data (version number, date etc.) either on the reverse of the title page or on the back page.

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[36] Parallel structures make content more predictable and predictable content makes it easier for readers to find the information they need.

Format

- Manuals should be in a format that is printable.

- The maximum printing size should be A4, although A5 is more suitable and less wasteful for booklet printing.

- Information for electronic media should be the same as that in the printed version and follow the same structure.

- Warning messages for rare scenarios should be included in the relevant sections in the electronic structure.

- Electronic media and digital manuals should be printable if desired by a user.

- Printed manuals should be made available as PDFs.

- Video instructions if available should be mentioned in the manual and its location for viewing and downloading should be specified.

- Emphasise safety information using a different font size/colour/style and use the standard symbols with the standard signal words.

- Instructions should be labelled clearly 'Keep for future reference'. This information should be presented where a user is most likely to see it, such as the front page. The label should be in a larger font size than normal text and highlighted in a suitable style.

- Instructions should be separate from the packaging and if it is attached to the packaging, it should be detachable.

- For translated manuals, all available language versions should be accessible through the supplier's websites.

Presentation and layout (general)

Headings

- Start each major section with level 1 heading.

- Keep headings concise so that they act as a guide to assist the user to find the information they need quickly.

- Make headings bold or use a thicker version of the font.

- Include keywords at the start of the heading to capture attention.

- Avoid major headings at the bottom of the page, rather they should be placed at the top of the page or close to the top.

Paragraphs

- Use regular (not bold or italic) font for the main body text.

- Align text to the left.

- Use single columns for A5 manuals. In A4 manuals, use single column if the text is larger than 10 point and no more than two columns for text of 10 points or less in size.

- Ensure text blocks are proportionate and use white space productively.

- Keep headings and content together.

- Group related content in close physical proximity to establish a visual relationship. Headings should be in close proximity to content and captions should be in close proximity to tables and diagrams.

Procedures and steps

- Number the steps if they need to be taken in a specific order.

- Include only one command per sentence or very closely linked commands in one sentence.

- Keep procedures as short as possible and consider splitting procedures with 10+ steps.

- If a procedure involves a hazard, add a warning directly before the text and not after the text.

- Explain the purpose of a procedure and state all prerequisites at the beginning of the procedure.

- Precede all procedures and lists with a colon regardless of whether the step is a full sentence or not.

Page numbers

- Number pages using format 'page x of total pages'.

- Make page numbers large enough so they can be seen easily.

- Explain in alphabetical order technical terms, acronyms and abbreviations.

- Include a glossary at the start before the content or at the end.

- Explain an acronym or abbreviation by writing it in full the first instance it is used and also include it within the glossary and index.

Tables

- Use tables when providing lists of items with associated content. Tables present information that is easier to visually search through.

- Position tables next to the associated text.

- Use captions only if the purpose of a table is not clear from the heading immediately above in the text, the headings within the table or the text preceding the table.

- Design tables consistently throughout the manual in terms of its colours, line thickness, font, spacing and other features.

- Avoid breaking tables and if you do need to break the table, repeat the table heading.

Figures

- Captions for figures are not necessary if the figure is a simple one and placed adjacent to the text to which it relates. Captions are only needed if they add value by providing information that would otherwise be missing.

- If captions are used, they should be placed directly underneath the figure on the same page.

- Text in figures should be legible and of an appropriate size that is easily legible (which may be slightly smaller than body text). Use the same font for all figures.

Bullets and lists

- Use bullet points to break down instructions and include one command per bullet.

- Keep blocks of bullets together.

- List items using bullets and don't continue the introductory sentence through the list. Avoid lists that are one big sentence.[37]

- Do not use colons, commas or full stops after list items if they are not full sentences and do not use a full stop even if a list item completes the introductory sentence.

- Avoid mixing complete sentence list items with fragmented sentences, but if it is unavoidable start each list item with a capital letter and end each with a full stop.

Cross references and links

- Use cross references and links sparingly as they interrupt the flow of reading and can mean important information is overlooked.

- When cross referencing, make sure the two sections have at least one keyword in common to give the reader certainty to keep reading.

- Use links seamlessly in a sentence to avoid interruption and possibly move links to a separate section of related topics.

Colour perception considerations

- As a significant number of users may have a degree of colour-deficient vision, colour should only be used to improve understanding as an additional means for presentation, not the only means.

- Photocopying/printing considerations should be given when choosing colours as most manuals are printed black and white[38] and therefore choose colours that print well when printed black and white.

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[37] Achtelig, p120
[38] All the sample manuals selected were designed as black and white manuals.

Numbers and units

- Use SI units or the units of measurements used on the actual product. If the product's measurements are not SI units, SI equivalents should be included in parentheses.

Translated sections

- Distinguish between original and translated sections visually, for example using language codes on each page.

- Translated manuals should match the original version as closely as possible in terms of the number of pages and layout on each page.

Presentation of safety information and warnings

- Break down safety instructions into small chunks with supporting illustrations.

- Ensure the font is of good size as per the international standards.

- Be creative with the layout of safety information in comparison to the other sections to make it stand out to attract readers.

- Any instructions for use including safety signs in colour should follow the requirement under the ISO 3864 series.

- Place warnings before procedures where applicable and not at the end.

- Repeat warnings that appear on the product itself in manuals.

- Present warnings in the same way throughout, for example using the same symbol.

- Include a reminder to say 'always read and understand all warnings before using the product'. This helps a reader to quickly pick out a warning.

- Explain the reasons for warnings and consequences of not heeding them as this can make the user take the warnings more seriously.[39]

- Keep warnings short, a single line if possible and repeat if necessary.

- Do not use contractions in warnings. Use 'Do not' instead of 'Don't'.

- Warnings that are independent of a procedure and apply to the product in general should be placed in a separate section at the beginning of the document. This section should also include important warnings that relate to a specific operation and are repeated later in the manual.

- Warning messages for special hazards should last throughout the duration of the product's life. Therefore, discolouration and fading of signs with colours should be taken into account.

- Repeated warnings can be distracting and should really only be used when related to events or errors that users cannot foresee.

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[39] Achtelig, p124

Language

- Write topic-based and don't mix subjects.

- Write as though you are talking to the reader directly, using 'you' for consumer-facing manuals as this increases attention and avoids ambiguity.

- Consider using a controlled language like ASD-STE100 or Plain English for consistency and simplicity in terminologies.

- Use active voice and write in the present tense unless talking about something that will happen in the future.[40]

- Avoid using the word 'please' to give a command as it can imply something is optional.[41]

- Use verb noun as headings for process names because it is more concise and thus clear and unambiguous; for example, 'Start the machine' rather than 'Starting the machine'.

- Write in a gender-neutral style.

- Do not use discriminatory or potentially offensive language; keep text respectful.

- Instructions should be written using the main language of the country of sale. Any additional languages should consider the existence of tourists, migrants and other groups who may not necessarily understand a language they are unfamiliar with.

Graphics and illustration

- Use illustrations and diagrams for instructions where possible, supported with text.

- Ensure consistency in terminology between illustrations/diagrams and text.

- Illustrations should be composed by a suitably qualified graphic artist or technical illustrator.

- Illustrations should be placed next to any text explaining it so they can be understood together.

- Illustrations should be accompanied by a caption if the caption adds value.

- Illustrations should be numbered if they are referred to elsewhere. However, in an instruction manual it is better to repeat a figure than to refer back to a previous one.

- Recommended heights of graphical symbols are 10mm for standard warning symbols and 5mm for other symbols.

- One illustration should relate to one item of instruction.

- Do not use graphical symbols in continuous text; separate them from the text, so that their purpose is clear.

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[40] Achtelig, p103
[41] Achtelig, p106

Font

- Use sans-serif font for online help pages.

- Serif or sans-serif can be used for printed manuals.

- Choose a font of medium thickness – thick lines make whole text look bold and obtrusive; likewise, very thin lines can make reading difficult for some readers and can also fade over time in printed manuals.

- It is recommended that the main content is in at least size 10 font and no more than size 13 font; headings should be in at least size 12 font. Where text font size of less than 10 point cannot be avoided, a large complimentary version in print should be made available.

Production

- Choose a suitable tool to produce the manual, taking into consideration the required outputs.

- Create a writer-friendly template where styles and formatting are automated and time is not spent formatting manually.

- Adopt a writing style based on a language style such as ASD-STE100 or plain English. Whichever you choose, the key to the success of a manual is consistency at every level.

- Illustrations should be composed by a suitably qualified graphic artist or technical illustrator.

- The quality of information must be checked and controlled by the supplier.

- Any professional hired to check over the instructions must have sufficient communication and language skills and know how to prepare instructions for use and how to tailor to a target audience.

- Establish a style guide for product manual writing within the organisation, taking into consideration standards and guidance available.

- Build an editing checklist that also includes keywords and terminologies to check during the editing process.

- Establish a documentation review and quality assurance process based on ISO/IEC guidelines.

- Do not incorporate layout checking with proofreading. Treat the two as separate.

- Proofreading of the text should be conducted by someone unconnected to the document but should be a native speaker and someone who is familiar with the product.

- Instructions should be written using the main language of the country of sale.

- Specialist translators who are competent in their field should be used when translating languages and when proofreading instructions; slang should be avoided.

- Translations of instructions into English should follow the principles of 'Plain English' or similar and preferably be edited or tested by independent organisations specialising in writing documents simply for the public.

Content to include

Product identification information

- Product name.

- Model number.

- SKU number.

- Product version number.

Manual identification information

- Manual part/identity number.

- Date of issue.

- Version number.

- Compliance with any standards should be clearly indicated, plus CE mark if appropriate.

- The name and address of the publisher if different from that of the supplier.

Purpose of instruction

- A statement to keep the instructions for future reference.

- Meaning of graphical symbols.

Safety information

- Explanation of graphical symbols used in safety-related information.

- Signal words (Danger, Warning, Caution) plus graphical symbols.

- Intended use of the product.

- Safe use of the product.

- The main function/purpose and scope of application and essential safety principles to be observed.

- Electrical safety.

- Limits of application (place, time, environment and type of application, materials and additives, any necessary tools, climatic conditions for operation and storage).

- Protective features that need to be installed or activated by users.

- Potential hazards or precautions for specific groups of persons that would not be immediately obvious.

- Potential health consequences that may result from failure to observe precautions or avoid hazards.

- Description of the user type (for example, skilled persons or non-skilled persons older than 18 years).

- Specific indications that products are no longer safe to use (due to wear, ageing or damage etc.).

- Information about personal protective equipment.

- Restrictions and/or recommendations for safe use (e.g. use in dry environments).

- Warning messages on reasonably foreseeable misuse.

- Warning messages regarding radiation (microwaves).

- Warning messages about potential fire risks, with information on how to deal with fires (e.g. type of fire extinguisher, fire blanket).

- Warning not to disassemble the product.

- Information on prevention of access by children or contact with pets, plants or insects.

- Potential hazards and their avoidance, and state the probable consequences of not avoiding them.

- Information regarding safe disposal at end of life.

- Important safety information to be repeated in other guides (e.g. Quick Start Guide).

Product specifications

- Product specifications at basic level; for example, weight, capacity and size.

- Methods of lifting, handling and transportation that are ergonomically efficient and will prevent damaging impacts (for example, by indicating gripping points and lock-down screws).

- Storage requirements with associated ambient conditions (for example, humidity, laying flat, avoiding direct sunlight.

- Information regarding energy consumption and energy efficiency rating, input voltage, insulation category (with appropriate symbols) and IP Code.

- Requirements for gas supply, water supply, fuses, cleaning agents, lubricants etc.

- Emitted noise level, waste discharge rate etc.

- Electromagnetic compatibility.

Installation

- Details of supplied product components and accessories.

- Illustration or photograph with the parts clearly labelled.

- Image of illustration of the product at the start, preferably the front page.

- Methods for the removal of transport and packaging restraints.

- Procedures for unpacking and for the removal and safe disposal or recycling of any protective and preservative packaging.

- A checklist of items included in the package.

- A layout plan with details of minimum space needed for use, maintenance and repair.

- Interconnection diagram/table.

- Conditions for assembly and mounting.

- Methods, precautions and legal requirements for connecting the product to power and water supplies, drainage and other auxiliary supplies.

- All information necessary for the commissioning of the product.

- Configurations and settings before first usage.

- Any requirements for first use of the product (e.g. initial cleaning cycle).

Operation

- Illustration of product with important features indicated.

- List of models and variants covered by the manual.

- How to use/operate the product.

- List of tasks by stakeholders where applicable.

- Operational environment; for example, is the appliance suitable for indoor usage only, suitable in vehicles or ships.

- Any initiating operations, checks, adjustments or conditioning required prior to use.

- Starting/stopping the product's operation.

- Running simple programmes.

- Recommended consumables.

- Full list of programmes and options with descriptions.

- Interrupting, changing or cancelling operation.

- Recovery after power failure or emergency stop.

- Illustrations that clarify or reinforce understanding of the main functions and safety precautions.

- After-use operations (e.g. cleaning filters).

- Recommendations for waste removal.

- Efficient use of product and tips for improving efficiency.

Maintenance information

- Daily maintenance and cleaning.

- Frequency of inspections, servicing and maintenance schedules.

- Statements of what maintenance can be done by the user and what must be done by a skilled person.

- Safety precautions and warnings for maintenance on running or live equipment.

- Repairs and adjustments covering what can be done by user and what by skilled repairer.

- Contact details for the supplier or other technical support.

- Warranty information.

- Maintenance details with illustrations for a skilled repairer in a separate document or section.

Troubleshooting information

- Indications for fault identification and normal operation.

- Descriptions of built-in diagnostic systems, drawings and diagrams.

- Aids for troubleshooting procedures.

- Directions for shutting down and isolating malfunctioning units.

Supplier details

- Contact details for the supplier or other technical support, including web address.

- Supplier address and authorised service centres for the product.

- Web addresses for obtaining copies of manuals, online help, spares.

- Web address relating to registration and benefits of registration.

- Telephone, email and web contact details for complaints or customer service queries.

- A list of the supplier locations and contact details.

- Information on compatible accessories and details of suppliers who stock specialist tools.

Appendix G - Technical writing industry

Production of technical manuals

Manufacturers adopt a number of methods for the production of manuals, including:

- In-house production

- Production at manufacturing sites

- Outsourcing to technical authoring services

For in-house production, the manufacturer uses its own staff to produce the manuals. Ideally, the company has a dedicated technical authoring team with the skills and tools necessary to publish high-quality manuals. However, this is not always possible. Inevitably there will be times of high demand when new products are about to come onto the market and then there will be slack periods, with little new writing to be done. Although the end result is professional-quality publications, manufacturers may not consider that the costs of maintaining a permanent team during the quiet times are justified.

An alternative is to use other employees, such as marketing staff, when the need for a new manual arises. Developers and engineers may also be expected to contribute to or even produce new manuals, particularly if the documentation is being created at manufacturing sites. While all these staff members will have a good understanding of the product, they may not necessarily have the skills required for creating effective documentation aimed at end users. The manuals may be technically correct but they may not be easy to understand for new users.

The third option is to outsource the production to a technical authoring service. This may appear an expensive option but it has the advantage that the services need only be paid for when there is work to be done. In addition, professional writers will tend to produce manuals much more quickly than staff drafted in from other departments to do the job. A technical authoring service will ensure that the final publication is professional, consistent and, most importantly, readily understood by end users. Typically, a manufacturer will build up a relationship with a technical authoring service so that manuals can be maintained in the future.

Technical Writing Tools

Microsoft Word

Most manuals end up being produced in Microsoft Word or a similar word processor. This software is readily available and most people asked to write a manual will already be familiar with its basic functionality. However, although ideally suited to the preparation of reports and similar documents, Word is not necessarily the best software to use when creating manuals. Producing well laid out manuals, with plenty of white space and sensible column and page breaks, can be quite a challenge with Word, particularly if there are a large number of illustrations to be incorporated in the text. For this reason, most technical writers will prefer to use some sort of page layout software, which provides much more control over the placing of text and illustrations.

Adobe InDesign

Adobe InDesign is becoming a popular tool for designing product manuals as it gives designers complete flexibility with layout and at the same time has some automated formatting functions to create a good writing template. InDesign is a great tool to combine illustrations with content as multiple text boxes can be overlapped to create the exact layout you desire.

Adobe FrameMaker

Adobe FrameMaker is a document processor designed for writing and editing large or complex documents, including structured documents. Adobe FrameMaker is the first software to cover native support for translation, authoring, and publishing of RTL languages without being restricted to a special FrameMaker language version.

FrameMaker has two ways of approaching documents: structured and unstructured.

- Structured FrameMaker is used to achieve consistency in documentation within industries such as aerospace, where several models of the same complex product exist, or pharmaceuticals, where translation and standardisation are important requirements in communications about products. Structured FrameMaker uses SGML and XML concepts. The author works with an EDD (Element Definition Document), which is a FrameMaker-specific DTD (Document Type Definition). The EDD defines the structure of a document where meaningful units are designated as elements nested in each other depending on their relationships, and where the formatting of these elements is based on their contexts. Attributes or Metadata can be added to these elements and used for single source publishing or for filtering elements during the output processes (such as publishing for print or for Web-based display).

- Unstructured FrameMaker uses tagged paragraphs without any imposed logical structure, except that expressed by the author's concept, topic organization, and the formatting supplied by paragraph tags.

Madcap Flare

Key features:[42]

- Building blocks and topic-based authoring

- Cross-references

- Link viewer

- Snippets

- Variables

- Images

- Multimedia

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[42] http://help.madcapsoftware.com/flare2017r2/Content/Introduction/Flare/Features/Key-Features-Flare.htm

- Cascading stylesheets

- Tables of contents

- Responsive web design

- Language support

- Importing and exporting

Doc-To-Help

Doc-To-Help is an easy to use Word-based solution for creating, managing and publishing online help, policy and procedure guides, eBooks and more.

Doc-To-Help is used by technical communicators, policy writers, customer support, trainers, and other content creators to create software documentation, online Help, product manuals, policy guides that can be published to multiple formats, including responsive web, PDF, ePub and more.

Key features:

- Single sourcing – one input, multiple output.

- Create content in Word (or use existing Word files), manage and collaborate with other writers, and publish to any number of formats, letting Doc-To-Help do all the work.

- The professional pre-written manuals included with MadCap Doc-To-Help are rich with content, and include everything needed to customise important documents.

- Installs a toolbar in Word to bring all of Doc-To-Help's features to the editing interface. Doc-To-Help ensures the content stays in Word™.

- Automates the content creation, management and publishing process.

Translations

There are two options for translating manuals: the employment of native-speaking translators or the use of computer translation tools.

By far the best option is to employ native-speaking translators. This ensures that the text is translated fluently and that the output will be easily read and understood by end users. The translation process will be relatively expensive in the first instance but if several manuals are being produced and these have sections of common text, the whole manual will not always have to be translated.

The alternative is to use translation tools, such as Google Translator and Madcap. While such tools will generate translated text extremely quickly and are a cheaper option than native-speaking translators, the translations will not always be accurate and nuances in the original text may be missed. Even when using such tools, it is essential to employ a native-speaking translator to check that the final text makes sense.

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