

Product specifications —

Part 2: Guide to identifying criteria for a product specification and to declaring product conformity

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Committees responsible for this British Standard

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- Association of Innovation Management
- Association of MBAs
- Association of Project Managers
- BEAMA Ltd.
- British Standards Society
- BSI Consumer Policy Committee
- Chartered Society of Designers
- Defence Manufacturers Association
- Design Council
- Department of Trade and Industry (Design Policy and Services)
- Electricity Association
- Federation of Small Businesses
- Forum for Private Business
- Institute of Quality Assurance
- Institution of Civil Engineers
- Institution of Engineering Designers
- Institution of Electrical Engineers
- Institution of Mechanical Engineers
- Ministry of Defence
- Royal Institute of British Architects
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Foreword

This British Standard has been prepared by Technical Committee MS/4 and its Panel MS/4/-/7.

BS 7373:1998, *Guide to the preparation of product specifications*, has been renumbered by amendment to become BS 7373-1:2001, *Product specifications — Part 1: Guide to preparation*.

Annex A, Annex B, Annex C, Annex D, Annex E, Annex F and Annex G are informative.

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Figure E.2 has been reproduced by kind permission of CSC Consulting & Systems Integration from: *The Manufacturing Industry Handbook* ~ © 1996 CSC.

This standard only provides generic guidance on the procedure for declaring product conformity. The preparation, content and ensuring that the product continues to meet the declaration is solely the responsibility of the producer/supplier.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 39 and a back cover.

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Introduction

This part of BS 7373 provides guidance on identifying criteria for the preparation of a product specification (alternatively known as a “product brief” in some sectors) essential when developing a new product or process. For organizations wishing to declare that their product conforms to a specification clause **10** provides guidance on declaring conformity.

While the provisions of this standard have been prepared with small- to medium-sized businesses in mind they are equally applicable to much larger organizations. This guide is aimed at those responsible for the product that the organization is planning to produce.

Guidance in this British Standard relates to new product development. For products already in production, and where a declaration of conformity is required, the guidance in clause **6**, clause **7**, clause **8**, clause **9** and clause **10** should be followed.

Many products fail to achieve their expected performance commercially and/or technically with disastrous results for the producer and dissatisfaction or worse for the customer.

Following the simple guidance in this British Standard can help manufacturers avoid problems commonly encountered such as:

- insufficient knowledge of the market/target customer;
- inadequate understanding between customer and producer;
- inadequate profit margins;
- the product being too expensive;
- failure to meet regulatory requirements;
- failure to meet performance targets;
- the time to market being too long;
- development expenditure being too high;
- insufficient in-house skills and knowledge to cover the process;
- excessive warranty, delivery or other commitments creating serious financial obligations.

The main benefit in dealing properly with these problems is a better product for which the commercial and technical risks have been assessed and eliminated or reduced to an acceptable level. The benefit to the producer can be significant both in reducing the cost of the product and/or in improving the quality, reliability and commercial viability of the product.

The purpose of this guide is to ensure attention is focused on the key areas that need to be addressed in order to assess viability and to acquire the data necessary to produce a product specification. These key areas are:

- a) commercial considerations (see **4.2**);
- b) product performance (see **4.3**); and
- c) regulatory requirements (see **4.4**).

Each of these areas is introduced in clause **4**. Further information about the process of gathering information is contained in clause **5**, drawing up and reviewing specifications in clause **6** and clause **7**, verifying and validating the product in clause **8** and clause **9**, and declaring conformity in clause **10**.

Informative Annex A, Annex B, Annex C, Annex D, Annex E, Annex F and Annex G provide material to support the preparation of specifications.

1 Scope

This British Standard gives guidance on identifying the criteria necessary for producing a product specification. It also includes guidance on declaring the conformity of the product.

NOTE 1 This British Standard considers common themes applicable to many products, which when examined by those responsible for development, help them to focus on the important criteria for individual products.

NOTE 2 The context in which product information is gathered and ultimately transcribed into one or more specifications is explained in Annex A. The nature of the resulting specification(s) will vary widely depending upon the complexity and scope of the final product.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 6001-0, *Sampling procedures for inspection by attributes — Part 0: Introduction to the BS 6001 attribute sampling system (ISO 2859-0:1995)*.

BS EN ISO 9001:2000, *Quality management systems — Requirements*.

BS EN 45014:1998, *General criteria for supplier's declaration of conformity*.

3 Terms and definitions

For the purposes of this standard the following terms and definitions apply.

3.1 criterion

decisive factor, measure or standard by which something can be judged or decided

NOTE This is usually expressed in terms of a parameter with limits, or a “yes” or “no”.

3.2 design review

documented, comprehensive and systematic examination of a design to evaluate its capacity to fulfil the requirements for quality and fitness for purpose, identify problems, if any, and propose the development of solutions

3.3 performance specification

document that specifies the totality of needs expressed by features, characteristics, process conditions, boundaries and exclusions defining the performance of a product or process, including quality requirements

3.4 product specification

documentation that details for production, end-use and other purposes the item concerned

3.5 test specification

documentation that describes in detail the methods of conducting tests including if necessary the criteria for assessing the results

NOTE A test specification may contain clauses for conformity and reliability assessment.

[BS 7000-10:1995]

3.6 requirement

need or expectation that is stated, generally implied or obligatory

NOTE 1 “Generally implied” means that it is custom or common practice for the organization, its customers and other interested parties, that the need or expectation under consideration is implied.

NOTE 2 A qualifier can be used to denote a specific type of requirement, e.g. product requirement, quality management requirement, customer requirement.

NOTE 3 A specified requirement is one which is stated, for example, in a document.

NOTE 4 Requirements can be generated by different interested parties.

[BS EN ISO 9000:2000]

3.7 verification

confirmation through the provision of objective evidence that specified requirements have been fulfilled

NOTE 1 The term “verified” is used to designate the corresponding status.

NOTE 2 Confirmation can comprise activities such as:

- a) performing alternative calculations;
- b) comparing a new design specification with a similar proven design specification;
- c) undertaking tests and demonstrations; and
- d) reviewing documents prior to issue.

[BS EN ISO 9000:2000]

3.8 validation

confirmation through the provision of objective evidence that the requirements for a specific or intended use of application have been fulfilled

NOTE 1 The term “validated” is used to designate the corresponding status.

NOTE 2 The use conditions for validation can be real or simulated.

[BS EN ISO 9000:2000]

4 Rationale for preparing a specification

4.1 Overview

It is easy to become obsessed with an innovative idea, or a new technology, without looking dispassionately at its overall viability or other justification to pursue it. By gathering sufficient information to understand the potential product its viability can be properly assessed. Gathering this information in a disciplined way facilitates decision making, and also exposes conflicts or trade-offs, allowing them to be resolved at an early stage and so avoiding problems later.

This clause looks at the three main areas that need to be understood when making decisions about the development of a new product. These areas are:

- a) commercial considerations;
- b) attributes of product performance necessary to satisfy the customer; and
- c) regulatory requirements.

Only when all the requirements for a new product have been understood is it possible to ensure that the product is safe or to review or test it adequately. Thus the development of a specification is the precursor to assuring safety, quality and reliability. Background on the product development process is given in Annex B.

4.2 Commercial considerations

An overview of the commercial issues, skills and knowledge necessary in bringing the product to the market should be established. The potential size of the market and share of that market which is being targeted should be determined. The latter can be vital in determining the viability of the product. The financial implications to the company, particularly in terms of budgetary provision for the development programme and working capital, should also be considered.

The way in which the product reaches the customer (e.g. direct selling, agents, distributors, retailers) should be understood as should the promotional effort that will be necessary. This promotional effort should be understood both in terms of developing links with those selling the product and in terms of developing links with those producing the product advertising and literature. For indirect sales selling to agents may demand as much effort as selling to the final customer. Whichever route to market is chosen the financial cost of sales and marketing should be known. This will almost certainly be a significant contributor to the overall selling price.

By examining these and related commercial issues, the key parameters that make the product a success become apparent. This information should be recorded to ensure that the required facts are available. Recording this information reduces the likelihood of misunderstandings and increases the chances of the right design decisions being made.

In the case of one-off or special purpose equipment, where the justification or demand would appear to be self-evident, it is still important to consider the commercial issues.

4.3 Product performance

All the pertinent information on the features of the product's performance that make the new product attractive and enable the performance targets to be met should be gathered. Performance is used here in its broadest sense to incorporate the function, quality, reliability and durability of the product so that the end-user is satisfied at an acceptable price.

Recording this information for use in the specification document keeps the minds of the designers focused, helping them to reach appropriate design solutions. Ultimately the specification will provide the criteria against which the product performance can be assessed. These test and acceptance criteria are generally established by putting maximum/minimum limits on each of the relevant product requirements.

4.4 Regulatory requirements

Many products are covered by statutory regulations, other countries' national standards or product standards that agents or customers will seek. It is necessary to understand exactly which regulations, EC Directives and standards are going to apply. This is particularly important during the development of the product because the way the design is executed can have a bearing on which regulations or standards are invoked or what product approvals might need to be sought. Thus the inclusion of regulatory requirements in the specification is important to the success and acceptance of the product in the market-place.

Annex C and Annex D give examples of standards that may be relevant and their relationship with legislation.

5 Identifying the criteria

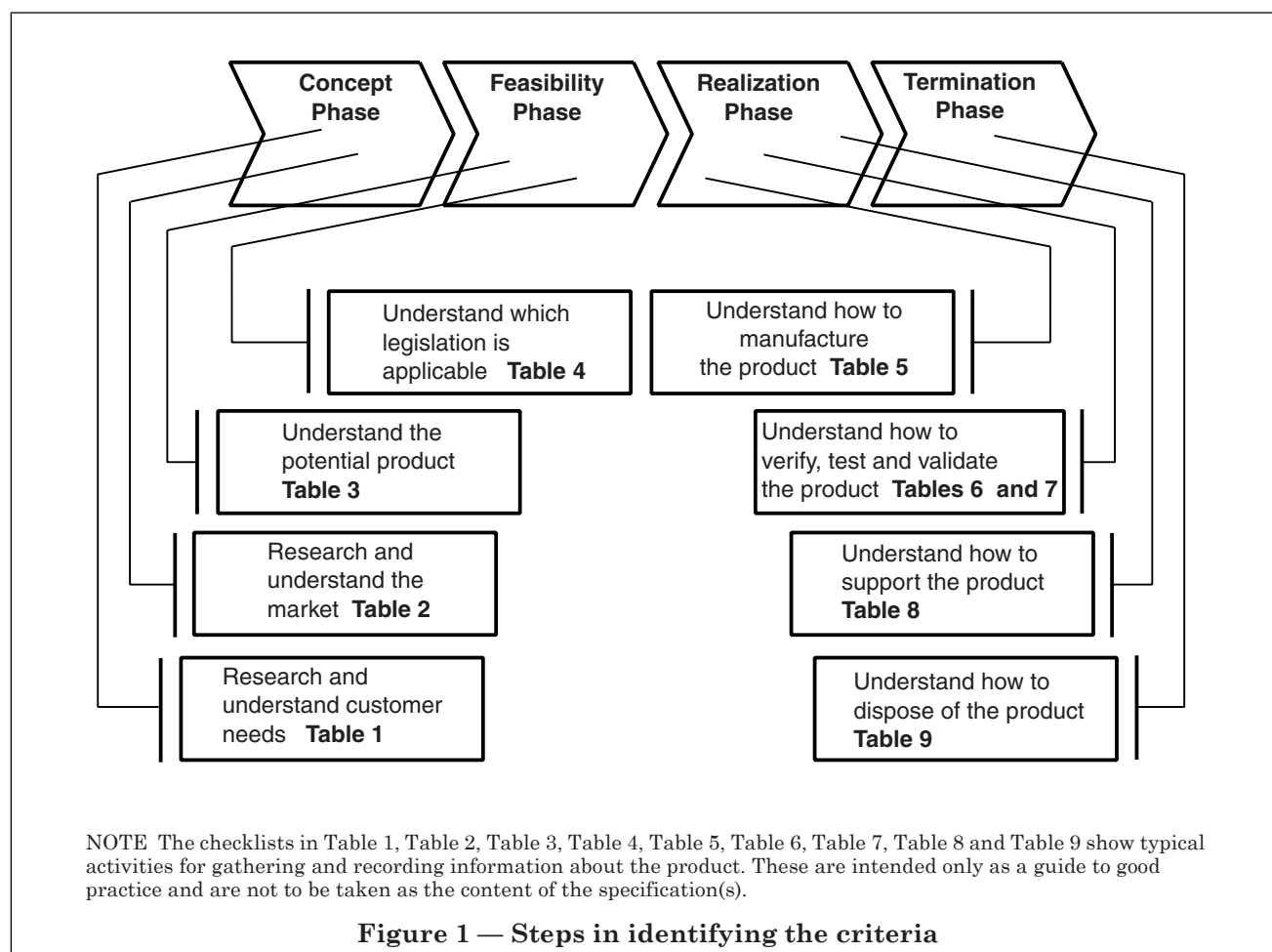
5.1 An overview of criteria to be gathered

This subclause describes the process of identifying criteria using a model and terminology consistent with BS 7000-2. Identification of the criteria is inevitably iterative as more information becomes available and decisions are made about user needs, design solutions, the detail of the design and how the product is to be manufactured. The most cost-effective approach is to concentrate on collecting the specific information necessary for immediate decisions. Over time, all of the criteria can be acquired. Prioritizing the criteria and arriving at the correct values is an iterative process throughout the early stages of product design.

In the case of trade-offs, conflicting requirements, or where there is a need to prioritize issues, the use of quality function deployment (QFD) can be a useful tool to aid decision making (see Annex E).

It is important to consider the whole life-cycle of the product and not just to concentrate on operation by the user. This means thinking about the market, product development, production, packaging, distribution, use, training, maintenance, repair, reuse, recycling, disposal and how each of these phases might affect the design, see Figure 1.

In evaluating which criteria relate to an individual product, it is recommended not only to use the checklists given in this standard, but also to think laterally about any other issues crucial to the success of the product and the satisfaction of customers. However the information is acquired it should be recorded.



5.2 Researching and understanding customer needs

In the preliminary phase information about customer requirements should be acquired. The criteria that are, or need to be, established should include those that will make the product a success. These are likely to be expressed in general terms but any limits on parameters such as size, weight, noise, power, colour or appearance should be included wherever practicable. Those product characteristics that give a market advantage over the competitors should be emphasized.

The concept of universal/accessible design should be embraced, considering the widest possible range of users, including children, older and disabled people. Guidance on how to take into account these groups is available in ISO/IEC Guide 71¹⁾.

A key issue is to ensure that the “voice of the customer” is heard throughout the organization in particular by those contributing to the new product design.

Conducting market research helps to identify customer needs, new market niches and customer acceptability. Initiating prototype testing, user trials, focus groups and user groups, involving consumers where appropriate, assists in achieving final model acceptance.

It is important to identify the customer.

¹⁾ In preparation.

EXAMPLE

Who is the customer for the toiletries in hotel bathrooms? In 1986 a well-known toiletries manufacturer increased its market share in this area by 400 %. The company had believed that the hotel guest was its primary customer. But after listening to hotel managers the company realized that the hotel managers wanted the products to communicate their hotel's image. Without changing the product's content, the manufacturer redesigned the packaging, concentrating on image, and quadrupled its market share.

Table 1 gives a recommended checklist for use when establishing customer needs.

Table 1 — Checklist for use when establishing customer needs

Customer needs ☐ Go and talk to all those interested in your product (e.g. as listed in clause 7). ☐ Identify who exactly the customer and key stakeholders are. ☐ Form a team of key stakeholders to contribute to the design and its review. ☐ Probe customer needs, wants and preferred choices. ☐ Record the anticipated “hard” requirements (objective and measurable) of the product (e.g. functional attributes, non-functional attributes and constraints). ☐ Record the anticipated “soft” characteristics of the product (e.g. look and feel, i.e. subjective guidance). ☐ Identify the main/unique selling features. ☐ Identify what will make a customer buy this product rather than that of a competitor. ☐ Define the target selling price on the basis of what the market will stand. ☐ Establish the standards or regulatory requirements that are likely to apply (are these known, understood and/or achievable?). ☐ Establish the desired lifetime of the product. ☐ List any unresolved issues and unknowns (to revisit later). NOTE There may be cases where nothing like this product has appeared on the market before; while some of the above items may not seem appropriate, due consideration should be given to all.

5.3 Researching and understanding the market

In order to assess the commercial viability of the product the size of the market, the competition, budgetary requirements, financial resources, return on investment, the window of opportunity and time to market should be understood. This information leads to conclusions about how and where to sell the product, the time-scales required, reliability and quality. All of these conclusions are criteria to be included eventually, as applicable, in the specification.

Table 2 gives a recommended checklist for use when identifying the market, competitor information and commercial viability.

Table 2 — Checklist for use when identifying the market, competitor information and commercial viability

The market

- ☐ Establish the potential size of the market.
- ☐ Establish if the market is growing or declining.
- ☐ Define the slice of the market you are aiming for (product positioning).
- ☐ Predict the level of sales (at least the minimum necessary for viability).
- ☐ Define how the product will reach the customer (direct selling, agents, distributors, retailers).
- ☐ Understand the needs of any distribution network to be used.
- ☐ Identify what promotional effort will be needed (both in terms of developing links with those selling your product and those producing your product advertising/literature).
- ☐ Establish what you should know and do for direct selling, including the use of e-commerce (e.g. internet, email and website).
- ☐ Consider how branding might assist in selling the product.
- ☐ Determine in which countries the product will be sold (it may be necessary to make changes to the product in order to conform to local regulations).
- ☐ Address the possible consequence of making product changes for different countries (if a single solution cannot satisfy all standards and regulations).
- ☐ Understand the formalities and procedures associated with exporting.
- ☐ Understand how you intend to market and sell your product in these countries.
- ☐ Understand the likely effect of fluctuating exchange rates on the product price.
- ☐ Record any requirements for point-of-sale packaging and product presentation.

Competitor information

- ☐ Identify competitors and/or potential competitors.
- ☐ Record what you know about them and their products.
- ☐ Investigate the price of competitive products.
- ☐ Compare competitors' product performance with what you are proposing to offer. Is there likely to be a threat? Can you enhance differentiation?
- ☐ Assess what future developments there are likely to be in competitive products before the launch of your product.
- ☐ Establish if the competition is based in the UK or overseas.
- ☐ Do you have a unique selling point (USP)?

Table 2 — Checklist for use when identifying the market, competitor information and commercial viability (*continued*)

Commercial viability

- ☐ Establish the “window of opportunity”, i.e. the timescale in which the product should be launched in order to capture the desired market share.
- ☐ Estimate what financial resources will be required for product development.
- ☐ Estimate the cost of sales and marketing (this is almost certainly a significant contributor to the overall selling price).
- ☐ Estimate the cost of distribution.
- ☐ Estimate the cost of after-sales service and training (where applicable).
- ☐ Try and establish what price the market will stand.
- ☐ Check that the selling price can realistically accommodate product development, manufacturing and sales costs and provide adequate profit margins (exporting, or using different approaches to selling, can affect sales costs significantly).
- ☐ Check that the product can be made or bought-in at a viable cost (adequate margin).
- ☐ Ensure you have adequate knowledge of trends in the market or new developments, technological or otherwise, that may affect the product.
- ☐ Establish if there might be any political ramifications associated with the product.
- ☐ Establish proposed warranty terms (period and extent) and ensure they are viable.
- ☐ List any unresolved risks and concerns (to revisit later).
- ☐ Consider the cost of not proceeding with the development, e.g. commercial damage through competitor opportunism and/or loss of potential business.
- ☐ Is there a real need for this product?
- ☐ Is it financially justifiable?
- ☐ Does it look possible?
- ☐ Can you take the market share you need?
- ☐ What is its growth and development potential?
- ☐ Decide if you should proceed with the project.

5.4 Understanding the potential product

In this phase the preferred product design begins to emerge and it becomes clear how the concept is to be implemented. Decisions are made about the final look and feel of the product and its performance. Trade-offs quite often need to be made between the customer’s perceived needs (see Table 1) and what is feasible within technical, financial and time constraints. Trade-offs might also be necessary in order to reach the best overall solution. Any relaxation of requirements should be checked for impact on the commercial or technical viability of the product.

Table 3 gives a recommended checklist for use when characterizing the potential product.

Table 3 — Checklist for use when characterizing the potential product

Product characteristics

- ☐ Where the product is dependent on scientific, technological, or engineering principles and know-how, ensure that they are understood and properly applied.
- ☐ Document an overview of the product including (as required):
 - ☐ key functions;
 - ☐ the architecture (the configuration and partitioning of the design);
 - ☐ a description and block diagram;
 - ☐ statements (to match the recommendations in Table 2) that describe in detail what the product has to achieve.
- ☐ Establish requirements for any embedded software, and document the architecture.
- ☐ List the ergonomic and aesthetic/graphic considerations.
- ☐ Establish if there are any relevant patents that might constrain the product.
- ☐ Consider patenting the idea yourself.
- ☐ Consider licensing.
- ☐ Describe user interface considerations, including design of labelling (size of font, permanence etc.).
- ☐ Record what environmental issues should be considered throughout the product lifecycle:
 - ☐ resources used;
 - ☐ energy consumption;
 - ☐ emissions to air;
 - ☐ emissions to water;
 - ☐ waste;
 - ☐ migration of hazardous substances;
 - ☐ impact on soil;
 - ☐ risk to the environment from accidents or misuse.
- ☐ Record the product's required life span in overall terms.
- ☐ Record what level of reliability is required.
- ☐ Record any special requirements for robustness, waterproofness, shock, vibration, acceleration, temperature (both operational and ambient), chemicals, etc.
- ☐ Establish that the product shelf-life allows adequate time for storage, distribution, retail display and use by the customer.
- ☐ Record any special requirements for materials (e.g. particular grades, recyclable materials).
- ☐ Establish if the product needs to be compatible with other products or systems either in its use, function or appearance.
- ☐ Undertake technical analysis of competitors' products where warranted.
- ☐ Consider "reverse engineering" competitor products to establish values for technical criteria.
- ☐ Establish a manufacturing strategy.
- ☐ Establish a testing strategy, to determine how testing will be performed to prove conformity to the specification, including for software.
- ☐ Confirm the technical feasibility.
- ☐ Define the customer acceptance criteria that should be met.
- ☐ Establish a strategy for product disposal (consider degradability/recycling).
- ☐ Consider methods of increasing life-span and designing and supplying easily replaceable parts.
- ☐ Consider the environmental impact of the product.

Table 3 — Checklist for use when characterizing the potential product (continued)

Product definition ☐ Record any technical limitations. ☐ Record any possible trade-offs (what priority the various requirements have). ☐ Establish the favoured technical solution and its feasibility. ☐ Analyse requirements for any embedded software and prepare system/module specifications as appropriate. ☐ Undertake the outline design. ☐ Consider manufacturability, serviceability, reliability and testability. ☐ Undertake analysis and/or modelling (as appropriate). ☐ Build prototypes and prove the viability of the design (as appropriate). ☐ Document the detailed design and ensure the level matches the needs of the customer. ☐ Consider how the design will be verified (see Table 6). Skills and knowledge ☐ Assess the skills and expertise required to create and market the product. ☐ Establish if the organization has these skills and expertise in-house. ☐ If not establish how to buy-in or sub-contract and establish the associated costs.

5.5 Understanding which legislation and standards are applicable

For many products EC Directives or other national legislation are applicable and it is necessary to establish which Directives and thus which regulations and standards may have an impact on the design. In some cases the design approach may dictate whether particular Directives or standards are relevant.

EXAMPLE

A mains electricity powered product will usually be subject to the Low Voltage (L.V.) Directive (requiring a technical file, and CE marking) whereas the same product running from a mains adaptor will not be subject to the L.V. Directive (although the adaptor itself will be). Thus taking the latter approach might considerably loosen constraints on the design and manufacture of the product.

The specification should include reference to any standards it has been decided the design shall meet (e.g. ISO, EN, BS). If these standards in turn impose particular requirements that are not already implicit in the design then these requirements should be listed in the specification (e.g. a requirement for limited flammability printed circuit board material, UL 94v0, in an electronics product). If the standards impose requirements that will be met by default then these requirements should also be listed in the specification.

Table 4 gives a recommended checklist for identifying applicable legislation and standards.