

# ***STYLE GUIDE FOR THESES AND DISSERTATIONS***

**GRADUATE SCHOOL OF  
ENGINEERING & THE BUILT ENVIRONMENT**





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# 1 INTRODUCTION

This guide is intended for postgraduates who are preparing project reports, dissertations, or theses. The intention is to provide a concise guide covering all aspects of research documents. It does not, however, aim to provide comprehensive information on detailed stylistic features. There are in addition, usages which are specific to a given branch of engineering. Candidates should therefore consult their supervisors about the specific requirements of their topic and discipline.

It should be noted that in the Faculty of Engineering and the Built Environment, the terms thesis, dissertation and research report have specific meanings: a 'thesis' is the document submitted for the degree of Doctor of Philosophy; a 'dissertation' that for the degree of Master of Science in Engineering by research only, and a 'research report' that for the degree of Master of Science in Engineering by advanced coursework and research.

In the Built Environment component, the terms 'thesis' and 'dissertation' apply to doctoral degrees and research masters respectively. However, the term 'discourse' is still used in certain of the masters degrees by advanced coursework and research.

The word 'thesis' is used in this document for simplicity, but the information given applies to theses, dissertations and research reports.

## **2 THE STRUCTURE AND FORM OF THESES, DISSERTATIONS AND RESEARCH REPORTS**

This chapter does not aim to provide comprehensive information on all matters relating to form and structure in thesis writing. For a detailed guide on presentation the candidate is advised to consult a standard text on the subject.

### **2.1 The Structure and Form of a Thesis – Preliminaries**

The essential elements of a thesis are presented below in the order in which they should normally appear.

Title and Title page

Candidate's Declaration

Abstract

Dedication

Acknowledgements

Contents

List of Figures

List of Tables

List of Symbols

Nomenclature

Introductory Chapter

Central Chapters

Concluding Chapter

References

Bibliography

Appendices

### **2.1.1 Title and title page**

A specimen title page is shown in Appendix A. The following information is given on the title page.

#### **Title**

The title should indicate the contents and scope of the thesis in as few words as possible. Phrases like 'a report on investigations into ...' and 'observations on some aspects of ...' add nothing significant to the title and should be avoided. While the title should be as brief as possible it should be accurate, descriptive and comprehensive, clearly indicating the subject of the investigation. It is most important that the title of a thesis be an accurate description of the contents of the work.

The title is best printed in capitals, with a space between each letter and three spaced between words.

#### **Author's name**

The full forenames (given names) followed by the surname (family name) are usually given under the title. They should be typed with the first letter of each name in capital letters and the remainder in lower case.

#### **Thesis statement**

The following are examples of the correct wording:

Doctor of Philosophy:

'A thesis submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy.'



Master of Science in Engineering by research only:

'A dissertation submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science in Engineering.'

Master of Science in Engineering by advanced coursework and research:

'A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science in Engineering.'

### **Year when the thesis was completed**

This lowest line should be no more than 25mm from the foot of the page, and should include the place and date of completion of the thesis, eg Johannesburg 2006.

### **2.1.2 Contents**

The contents should be given on separate sheets and follow the structure and form of the thesis (Section 2.1 above) and the headings in the thesis itself. The contents should only contain the first three levels of headings in the thesis. It must also include the relevant page numbers.

(A specimen contents page is shown in Appendix B)

### **2.1.3 Candidate's declaration**

University regulation G.28 requires the following:

Together with the thesis, dissertation or other work the candidate shall submit a formal declaration stating –

- a) whether it is unaided work, or what assistance has been received;
- b) whether the substance or any part of it has been submitted in the past or is being or is to be submitted for a degree to any other university;
- c) Whether any information used in the thesis, dissertation or other work has been obtained while employed by, or working under the aegis of, any person or organisation other than the University.

An example of the conventional form of declaration is as follows:

## DECLARATION

I declare that this thesis\* is my own unaided work. It is being submitted to the Degree of Doctor of Philosophy\*\* to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.

.....  
(Signature of Candidate)

..... day of ..... year .....  
*day month year*

\* dissertation or research report, as applicable

\*\* or Master of Science as applicable

This declaration should appear on a separate page and each copy of the thesis should be individually signed by the candidate.

### 2.1.4 Abstract

The abstract is a brief informative summary of not more than **150** words for a master's dissertation or research report and not more than **350** words for a doctoral thesis. It outlines the purpose of the work, the research methods and procedures employed, as well as the major results and conclusions. The abstract should always start with a statement of the major theme of the thesis.

The abstract is extremely important. It should give the significant facts as concisely as possible, especially anything new, the main conclusions and any recommendations. The reader can then decide whether or not to read further. An abstract should be written in normal style. (See section 8.2 on the University's requirements for abstracts.)

### **2.1.5 Dedication**

This is a brief, optional statement paying tribute to the writer's spouse, partner, family, or other associated persons. It is typed centrally on a separate page starting on the chapter line and does not require a heading, eg

In memory of my mother

Ruby Johnson

### **2.1.6 Acknowledgements**

Assistance received in carrying out the work of preparing a thesis should be acknowledged, although it is not usual to acknowledge routine checking, minor assistance or general advice. It is, however, usual to acknowledge the assistance of a supervisor, financial assistance, permission to publish, as well as special facilities provided by a company, university or research institution.

### **2.1.7 List of figures**

A list of figures follows the contents on a new page, and precedes a list of tables.

(A specimen list of figures is shown in Appendix C)

### **2.1.8 List of tables**

A list of tables follows the list of figures on a new page.

(A specimen list of tables is shown in Appendix D)

### **2.1.9 List of symbols**

Each thesis should provide a list detailing the symbols and SI units for physical quantities used. A specimen list of symbols appears in Appendix E. Symbols vary from discipline to discipline and candidates should consult their supervisors with regard to the correct symbols for their field of research.

### **2.1.10 Nomenclature**

Authors should avoid jargon, abbreviations and acronyms which are not in common use in the field or which have not been defined. If there are acronyms or unusual technical terms, each should be defined when it first occurs in the text, and also included in a list of nomenclature as an appendix.

## **2.2 Body of the Thesis**

In most theses the chapters may readily be divided into three categories: the introductory chapter or chapters; the central chapters comprising the major report of the study, divided into logical chapter divisions; and the concluding chapter or chapters, which should contain the findings, conclusions, and recommendations of the thesis.

### **2.2.1 Introductory chapter**

The first chapter, or chapters, should contain the following items:

- A clear and complete statement of the problem investigated, the hypothesis tested or the purpose of the study;
- A validation or justification, which, by a discussion of discriminatingly

selected reasons, establishes the importance of the problem. It is often appropriate to indicate the limits of the research and to define words unique to the study or used in a restricted or unusual manner in reporting the investigation;

- A preview of the organisation of the remainder of the thesis. This should make it easy for the reader to understand the relationship between the various parts of the work;
- A résumé of the history and present status of the problem by means of a literature survey comprising a brief critical review of previous investigations of this and closely related problems. The contribution of each of these to the topic should be made clear, together with the fact that the investigation now in progress arises from the inadequacies of earlier studies or to extend them;
- A statement of the sources of data, the method of procedure (experimental techniques) and the treatment of the findings. In a thesis of an experimental nature, a separate chapter is ordinarily devoted to these topics.

### **2.2.2 Central Chapters**

It is impossible to give specific directions for organising the findings of all studies, because of the wide variety of topics investigated, techniques employed, and kinds of data accumulated. Suffice it to say that the chapters of this portion of the document are the thesis – they make the candidate's contribution to knowledge. All other portions of the manuscript are subordinate to what has actually been discovered and is now being made known. The candidate should, therefore, take great pains to present the material in a clear and orderly fashion, in terms that can be readily understood.

The organisation and distribution of content should be such that each chapter represents an important division of the subject investigated and reported. Each

chapter, other than the introductory and final chapters, should open with a paragraph or two containing:

- a statement of the portion of the problem to which the chapter is devoted
- a description of the materials and methods used in connection with this part of the investigation, and
- an enumeration of the points to be covered.

In many theses, the concluding section of each chapter will consist of a summary indicating the contribution of that chapter to the whole study.

### **2.2.3 Concluding chapter**

The concluding chapter, or chapters, should be a summary, restating the developments or previous chapters and showing succinctly the more important findings and conclusions of the whole study. The author may list unanswered questions that have occurred but which require research beyond the limits of the undertaking reported.

## **2.3 References and Bibliography**

When students do assignments and reports, they use sources such as books and journals. Because of ethical requirements and the laws of copyright, students have to identify the sources that they quote from or paraphrase. References (also called 'source citations') are required when students use complete thoughts and unique phrases from books.

Students are guilty of plagiarism if they try to pass off the work of another author as their own. Plagiarism is a serious offence. An example of plagiarism is when students copy parts of books or articles in their assignments. It is also illegal to copy sentences, paragraphs, or specific information without acknowledging the source or providing a reference. Students may not write assignments by

combining quotations, even if source citations are provided. Assignments and reports must be students' own work, written in their own words and providing considered interpretations of the sources.

A reference consists of two parts. In the assignment or report the sources are cited in parentheses. Short author-date citations refer to the second part of the reference, namely the list of references at the end of the document, where full bibliographical information is given. All sources cited in the assignment or report must be included in the reference list.

A summary of the author-date system of documentation is given in section 2.3.1. For more detailed information, students should consult the sources given on page 15.

In brief, references should be chosen and cited to:

- indicate the source of the writer's statements
- acknowledge another person's work
- provide a source of additional information

The relevance of any reference should be carefully considered and the number of references kept to a necessary minimum. All references appear together at the end of the publication. The citations must be given in sufficient detail for easy retrieval of the information.

References are used when students use a direct quotation from a book or published paper or article and where they paraphrase a passage from such a source. A reference lists the author, year of publication and page number of the source that is quoted or paraphrased.

The quotation is given in quotation marks (inverted commas) followed by the reference written in brackets (parentheses), eg "A stairway cut in the cliffs led up to the end of the headland ..." (Lewcock 1976:89) providing access for the inhabitants of the town. (Example of a quotation.)

Lewcock (1976:89) indicates that access from the town was gained by a stair cut into the cliff.

### **2.3.1 Referencing systems**

There are a number of different referencing systems. The two most commonly used in scientific literature are the Harvard system and the Numerical system. Candidates should consult their supervisors on this matter. You should note that styles for citations vary tremendously from discipline to discipline, and that not all the points mentioned (eg title of paper, or inclusive pagination) may be necessary. Note that the Built Environment disciplines require the use of the Harvard system for referencing. This method is explained in Smith M (1995) Style Guide for the writing of theses and dissertations. Johannesburg: University of the Witwatersrand Library.

#### **Harvard system/Author-date system**

The references are referred to in the text by the author's surname followed by the year of publication (in brackets) and are listed in alphabetical order in the list of references. If a number of articles by the same author are cited they are listed in year order, starting from the oldest reference. In each case full page numbers for the article must be given.

If there are three or more authors, only the first (senior) author's name is given in the text followed by 'et al'. The full list of names is given in the reference list. Note the recommended layout of the reference list.

#### **Specimen text (Harvard system)**

A succinct account of the basics of interactive television programming has been given (Bolton, 1981). Nyhan and Johansen (1980) have summarised the economic implications. Robertson (1979) has reviewed some of the technical aspects. (Veith (1981a, 1981b) has provided the best all-round accounts of teletext and videotext.



### **Specimen Reference List (Harvard system)**

- Bolton, W T. (1981) A lesson in interactive television programming, *Journal of Library Automation*, vol.14, no2,pp.103 – 108.
- Nyhan, M J and Johansen, R. (1980), Videotext and teletext in the United States, *Telecommunication Journal*, vol. 46,no,6,pp.396 – 400
- Robertson, A. (1997)) Teletext and view data, In: Johansen, P. ed. *Television to Home Computer*, Blandford Press, London, UK,pp.119 – 145
- Veith, R.H. (1981a) *Teletext*, University of Illinois, Urbana, Illinois, USA
- Veith, R.H. (1985) *Videotext*, University of Illinois, Urbana, Illinois, USA

### **Numerical system**

The references are numbered in ascending order in the text, and are listed in that order in the list of references. In the text itself, the numerals are typed slightly above the list of the text.

### **Specimen text (numerical system)**

Bolton<sup>(1)</sup> has given a succinct account of the basis of interactive television programming. Nyhan and Johansen<sup>(2)</sup> have summarised the economic implications. Robertson<sup>(3)</sup> has reviewed some of the technical aspects. Veith<sup>(4,5)</sup> has provided the best all-round accounts of teletext and videotext.

### **Specimen Reference List (numercial system)**

1. Bolton, W T. (1981) A lesson in interactive television programming, *Journal of Library Automation*, vol.14, no2,pp.103 – 108.
2. Nyhan, M J and Johansen, R. (1980), Videotext and teletext in the United States, *Telecommunication Journal*, vol. 46,no,6,pp.396 – 400

3. Robertson, A. (1997)) Teletext and view data, In: Johansen, P. ed.  
*Television to Home Computer*, Blandford Press, London, UK, pp.119 – 145
  4. Veith, R.H. (1981a) *Teletext*, University of Illinois, Urbana, Illinois, USA
  5. Veith, R.H. (1981b) *Videotext*, University of Illinois, Urbana, Illinois, USA
- (Note: Reference lists in the numerical system are not purposefully in alphabetical order.)

### 2.3.2 Citations

The order in which items in the references are listed is as follows:

- author's name
- year of reference (Harvard system)
- title of article, book, report, thesis or dissertation
- edition numbers of book or report number of report
- name of journal, publisher, conference, sponsor or report or the word Transactions or Proceedings followed by name of conference or publishing organisation
- location of publisher (city, country) (in the case of a book)
- location of journal, conference, sponsor or society if not well known (city, country)
- volume number, issue number, month (abbreviated)
- year of reference (numerical system)
- inclusive page numbers of journal articles.

### 2.3.3 Punctuation guidelines

- a comma is inserted after author's surname, but full stops are inserted after author's initial(s)
- names of journals are written in full unless the abbreviation is accepted practice in the relevant discipline
- titles of books, reports theses, specifications and journals are capitalised; those of articles submitted to journals and conference transactions and pro-

ceedings have the first word only capitalised.

- Titles of books and journals are either in italics, bold or underlined.

#### **2.3.4 Bibliography**

Any supplementary literature not directly referred to in the text, but considered to be relevant and of interest, may be put after the references in a Bibliography.

#### **2.3.5 Referencing the Internet and CD-Rom**

- Internet articles

JORDAN, San. (1995). Jericho's wakks. INTERNET. <http://www.buildind.co.za>  
Cited 31 January 1996.

(The date in brackets indicates when the article was written. The date at the end is when the student has accessed the Internet site.)

- CD-ROM

MORAN, David, Ed (1996). Encyclopaedia Britannica [CD-ROM]. London, UK: Encyclopaedia Britannica.

#### **2.3.6 Referencing Architectural Illustrations**

When an illustration of a building is used in assignments, a caption must be written below it to indicate the name of the architect (if applicable), the name of the building, its location and year of completion. After the caption students must indicate the source of the illustration. Where a photograph or drawing is photocopied or scanned the caption and source citation are written as follows:

Bernini. S. Andrea al Quirinale. Rome, 1658 – 70 (Murray 1996:54).

- If the picture is traced or redrawn, the source is acknowledged by using the word "after":

Bernini. S. Andrea al Quirinale. Rome, 1658 – 70 (after Murray 1996:54)

- If students make their own drawings by processing information in books, they will need to indicate where the information comes from. This is done by using

the phrase “derived from” in the reference:

Bernini, S. Andrea al Quirinale. Rome, 1658 – 70 (derived from Murrar 1996:54).

## 2.4 Appendices

Appendices are convenient places for recording complicated mathematical or other formulae, descriptions of experiments or apparatus, and any other specialised or lengthy material such as tabulated experimental observations, computer programme listings, copies of spectra or other instrumental outputs that would otherwise detract from the readability of the text. The reader should be able to study or refer to these later. Appendices must be numbered or lettered consecutively in large print at the top right-hand corner of the page to facilitate their location in the text. Each appendix must start on a new page. The appendices should be placed immediately after the list of references.

## BIBLIOGRAPHY

GROSSMAN, J ed. (1993). The Chicago Manual of Style. Fourteenth edition. Chicago, USA and London, UK. The University of Chicago Press.

SMITH, M (1995). Style Guide for the writing of theses and dissertations. Johannesburg, South Africa: University of the Witwatersrand Library.

TURABIAN, K L: (1987). A Manual for Writers of term Papers, Theses and Dissertations. Chicago, USA; University of the Chicago Press.

### 3 HEADINGS AND NUMBERING

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The arrangement of headings of various levels (hierarchical positions) reflects the organisation of the contents of the thesis, dissertation or report.

The levels of headings may be indicated by typeface and format alone. For example, the heading '**TWO-PHASE FLOW**' is recognisably of higher level than '**Onset of flow instability**'.

The decimal numbering of such headings further clarifies the importance sequence and interrelation of the portions of text under each heading. Thus the headings '**2 TWO-PHASE FLOW**' and '**2.3.3 Onset of flow instability**' are even more informative than the corresponding unnumbered headings.

Numbering also facilitates cross-referencing within the text.

#### 3.1 Rules of Numbering

- Arabic numerals should be used throughout.
- First level headings (usually chapter headings) are numbered continuously beginning with 1.
- Each main division of text (chapter) may be divided into any reasonable number of subdivisions, having second level headings, which are also continuously numbered. This method of division and numbering can, in principle, be continued to any level, but tends to become clumsy and confusing beyond the third level.
- Numbering should be confined to the first three levels. Further (unnumbered) levels of headings may be identified by typeface and format (see 3.2).
- The numbers designating headings of different levels are separated by full stops (the present document serves as an example). No full stop appears after the last number; this holds also if only one number (that of a first level

heading) is present (thus, '**2 TWO PHASE FLOW**' and not '**2. TWO PHASE FLOW**').

### **3.2 Typeface and Format**

The typeface and format of all headings should reflect their levels, independently of numbering. The typographical details of the system of headings will be dictated largely by the printing system that is used in final production of the document. Whatever the typography, it is essential that the system be logical and that it be applied consistently.

Modern practice favours left-hand-justified, rather than centred headings. Note also, that no full stop appears at the end of a heading.

### **3.3 Examples of Systems of Headings**

#### **1 FIRST LEVEL HEADING**

##### **1.1 Second Level Heading**

###### **1.1.1 Third level heading**

**Fourth level heading**

**Fifth level heading.** Which leads into the text on the same line.

The following arrangements are also acceptable:

#### **1 FIRST LEVEL HEADING**

##### **1.1 Second Level Heading**

###### **1.1.1 Third level heading**

*Fourth level heading*

*Fifth level heading.* Which leads into the text on the same line.

## **4 STYLE AND PUNCTUATION**

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### **4.1 Text Structure**

A good thesis should be comprehensive and precise. To be concise at the same time the writer must watch the presentation carefully. The draft should be read through critically and unnecessary material eliminated. Where the writer's home language is not English, it is most important to seek help in this draft reading process.

The following are some of the techniques that will help:

- break down complex statements into lists
- use the active voice where appropriate
- do not use pompous words or jargon where simpler words are as effective
- avoid empty phrases such as 'it is interesting to note that ...'
- avoid unnecessary words, eg 'the precipitate was found to be in a wet condition' which means simply that 'the precipitate was wet'.

#### **4.1.1 Word choice**

##### **Use of the personal pronoun**

The argument against using personal pronouns is that the subject matter is the important thing and the author is not. This is basically sound as long as it is not carried to excess. When, however, it leads to vagueness in phrases like 'it is considered' or to ponderous writing like 'the author is of the opinion', then it is better to use a personal pronoun, eg 'I consider' or 'I think'.

##### **Technical language and jargon**

Technical language is a necessary part of scientific writing. The writer must, however, be certain that the reader will understand the language used. Where

there is doubt, terms should be defined either in the text or in a glossary.

For example, 'The hydrostatic loss appears to be responsible for dumping (or weeping) from sieve places...' is acceptable in a thesis intended for those familiar with distillation terms and concepts, but the statement becomes jargon when the potential readers may not be experts in the field.

Jargon is often created by introducing strange and unnecessary new words. For example, though colonise, oxidise and analyse are acceptable through general usage, blendorise, insolubilised and solubilisation are not: however frequently they may be used in a chemical laboratory they are unknown outside one.

#### **4.1.2 Tenses**

The following points may help to avoid common errors.

- Reports of work done are usually written in the past tense.
- Where universal truths such as a natural law are stated, the present tense is generally used
- Do not change tenses in a sentence unless there is a good reason for it. For example, if we say, 'The balloon rose because the hydrogen inside it was lighter than air', we may mean that this might apply only under the observed conditions; or we may mean that the gas used is inherently lighter than air. To make the meaning clear we must mix tenses within the sentence, eg 'the balloon rose because hydrogen is less dense than air'. But complications arise when tenses are changed without the writer having had a specific intention.



### **4.1.3 Sentence structure**

#### **Active and passive voice**

Traditionally technical writers have regarded the passive voice as the only acceptable form of presentation. In modern writing, however, the active voice is used more often. Phrases like 'Economy justifies the procedure', are preferred to 'the procedure may be justified in the interests of the economy'.

#### **Sentence length**

Long sentences with a number of dependent clauses are difficult to follow, particularly if the subject itself is complex. Reading tests have shown that sentences with more than 25 words are generally difficult to comprehend. Unless, therefore, you are master of the use of the English language, avoid long sentences.

### **4.1.4 Paragraphing**

Paragraphs are there to help the reader. They do so by breaking up the text into manageable sections. The following guidelines will assist in organising paragraphs.

- A paragraph should consist of a central statement supported by a group of details.
- In technical writing the main statement is usually at or near the beginning. For argument or persuasion, however, the central statement is often placed at the end as a climax to the supporting details.
- The transition between paragraphs should be smooth, with some form of connecting link in the text.
- Long unbroken sections of text are discouraging to the reader and therefore paragraphs should not be unduly long. If your writing has many paragraphs exceeding 100 words, you should examine it critically.

## **4.2 Conventions**

### **4.2.1 Capitals**

There is much confusion about the use of capitals and authorities differ considerably. The modern trend, however, is to use capitals sparingly. The following are some general guidelines;

- the first word in a sentence and in a direct quotation are capitalised; proper nouns are capitalised and common nouns such as river and company are also capitalised when they form part of a name eg River Amazon.
- Common nouns are capitalised when they are used with a number or letter to designate a specific thing, eg Laboratory D.

### **4.2.2 Acronyms**

An acronym is a word formed from the initial letters of a name or by combining initial letters, or parts of a series of words, eg 'radar': RA(dio) D(etecting) A(nd) R(anging). Certain acronyms like 'radar' have become dictionary words. In general, however, use acronyms sparingly and, when using them for the first time, spell them out. Where the acronym is not an accepted dictionary one it should be in capitals, eg ESKOM.

### **4.2.3 Spelling**

In language as complex as English there is no simple set of rules. When in doubt (eg, when to use 's' and when 'z') consult the Shorter Oxford English Dictionary, which gives the accepted Standard English spelling (preferred to the American) or the Oxford Dictionary for Writers and Editors. This dictionary, in addition to guidance of spelling, gives useful information on punctuation.

#### **4.2.4 Abbreviations**

Use only generally accepted abbreviations and symbols.

#### **4.2.5 Punctuation**

There are some 36 chief marks of punctuation. However, many of these are used only in specialised linguistic contexts and all should be used sparingly. For a concise guide to the use of the more common punctuation marks see Houp and Pearsall (1984).

#### **4.2.6 Pagination**

Pagination should run consecutively through the thesis with all pages (including figures, tables etc) numbered.

## 5 EXTRA-LINGUISTIC MATERIAL

The customary medium of communication is language. However, in the sciences and engineering extra-linguistic material such as numbers, symbols, mathematics, tables, graphs and illustrations of various kinds are frequently used. A cardinal principle for such material is that it should be used only when it is the most effective means of communication and understandable to the target audience.

### 5.1 Numerals

The rules for the correct use of numbers are simple and are in the main based on common sense.

- In the text use words rather than numerals for integers below ten. Exceptions to this rule occur in illustrations and tables, or when integers are associated with unit symbols. For numerals above ten, use whatever provides optimum clarity and good appearance.
- Where it is necessary to have decimal fractions these should be expressed in numerals, eg 'The original design required 2,7 times as many components as were finally used'. Do not use numerals for numbers, which are only approximations. Do not begin a sentence with a numeral. This can lead to confusion and is in any event displeasing to the eye.
- Ordinals from 'first to tenth' should be written out. For higher ordinals the author should once again use discretion.

\*When decimalisation was introduced into South Africa forty years ago, it was decreed that a comma be used as a decimal marker. However, now that South Africa has re-entered the world, this is being replaced by the more widely accepted full-stop, eg 2.7.

- Avoid writing out large and small numbers by using either accepted prefixes or exponential notation, eg  $253 \times 10^3$  or  $0.253 \times 10^6$ . Where large numbers must be written out these should be separated by a small space into groups of three counting from the left or right of the decimal marker, eg 5 241.2 or 0.524 65. They must never be separated by a comma, point or any other means. For numbers less than unity, a zero should precede the decimal marker, eg 0.325 not .325. When listing numbers – as in a table – always align them on the decimal marker.

## 5.2 Mathematics

Mathematics included in a text should form an integral part of the argument and should be intelligible to the intended readers. Detailed derivations and mathematics beyond the interest of the majority of readers should be put in an appendix.

Mathematics must be carefully presented using printed symbols. The units and symbols used should be consistent and follow international practice.

The form of presentation of a mathematical expression should be such that it:

- brings out clearly the structure of the expression
- is as simple as possible
- introduces minimum disturbance in the appearance of the printed page.

To comply with the last two points, algebraic fractions in the text should make use of a solidus or slash and not a horizontal bar. Thus write

$$(ax + b) / (cx + d) \text{ and not } \frac{ax + b}{cx + d}$$

However, note that careless use of the solidus can lead to ambiguities.

$$\text{Thus } a + b / y \text{ means } a + \frac{b}{y} \text{ and not } \frac{a + b}{y}$$

The correct form of the latter would be  $(a+b)/y$

Such ambiguities can generally be overcome by the use of parentheses, as in  $(a + b) / y$ ,  $\log(a / b)$  and  $(\sqrt{3})x$ . Be sure that all parentheses and brackets occur in pairs. Exponential expressions should be set up as  $e^{2\pi x/3y}$  or  $\exp(2\pi x/3y)$

However, with more complicated expressions the foregoing rules may violate the conditions above. It may then be necessary to simplify the expression or set it on a line all to itself. For example:

$$q = \frac{L(t_0 - t_3)}{\frac{1}{2\pi r_1 h_1} + \frac{1}{2\pi k} \ln \frac{r_2}{r_1} + \frac{1}{2\pi r_2 h_2}}$$

can be set out as:

$$q = L(t_0 - t_3) / \Sigma R_t$$

where

$$\Sigma R_t = (1 / 2\pi r_1 h_1) + (1 / 2\pi k) \ln(r_2 / r_1) + (1 / 2\pi r_2 h_2)$$

Left justification of all equations, as shown above, is favoured rather than vertical alignment of equal signs. Where the right hand side of an equation is too long to fit on one line, a break should be made before an operational sign (eg + or – ) or at some other logical point, but preferably not within a bracketed statement. The next line, starting with an operational sign, should then be placed just to the right of the equal sign. It may, however, not always be possible to avoid breaking a statement within a bracket. In this case the above rule should be observed as far as possible, as illustrated in the following example:

$$\Delta\omega = (1/y) \left[ \int f(v_1 A_1) \phi_1 \phi_2 dV + \int f(v_1 A_2) \phi_1 \phi_2 dV \right. \\ \left. + \int f(v_2 A_1) \phi_1 \phi_2 dV - \int f(v_2 A_2) \phi_1 \phi_2 dV \right]$$

where

$$y = \int (v_1 \phi_1 + v_1 \phi_2) dV$$

Particular care is required in the use of subscripts and superscripts. They should be placed next to the main symbol and half a space below or above it respectively. Where both are used they must line up vertically, ie  $A_s^2$  not  $A_s^2$ . Thus  $e^{x^2}$  should become  $\exp x^2$  and  $E_{1A}$  becomes  $E_{1,A}$ .

Periods (full stops) are generally omitted in abbreviations, eg  $T_{\max}$  not  $T_{\max}.$

Standard symbols should be used wherever possible and the recognised literature in the field consulted for references to these.

## 5.3 Tables

Tables are best used when a number of numerical values are to be compared or contrasted. They should be used only where data cannot be clearly presented in graphical form. For example, discrete data sets can frequently be compared more effectively by using a bar chart than a table.

A table is a form of graphical presentation. As such it should be kept simple and clear. Only relevant information of conclusions should be included. There is no need to put in all intermediate steps or results – they only cloud the main issue.

Tables can be either in landscape or in portrait. Portrait tables are those, which can be read when a page is in the normal position. Clearly they are the most convenient to read. Where possible they should be arranged to fit into a single page of the document. Landscape tables are used where their size is such that they cannot be fitted into the width of the printed page.

Each table should have a heading and be numbered with Arabic numerals. Tables should be numbered using a similar system to that described in Section 3.1. Thus, the first table in Chapter 2 is **Table 2.1**, the second is **Table 2.2** etc. The same principle holds for lettered appendices, but the full stop is omitted. Thus the third table in Appendix E is **Table E3**. Tables should be referred to in the text by means of the table number.

The columns in a table should be arranged for easy comparison, related information being brought together. Each column should carry a brief heading and include consistent units where relevant. The same symbols, units, and abbreviations should be used in the text. Table 5.1 illustrates some of these rules.

In column headings avoid using expressions like  $\times 10^3$  m as these are ambiguous. It is not clear whether the figures in the column have already been multiplied



by  $10^3$  or must be multiplied by  $10^3$ . Rather use the recognised metric prefixes, eg mm. Where this is not possible, make sure the heading is unambiguous.

For example, use 'Capital cost (R millions)' rather than ' $\times 10^6$  = Capital cost in R'.

**Table 5.1 Calibration of rotameter**

Position of Float (mm)	Flow rate (m <sup>3</sup> /h)	
	TL = 17 °C	TL = 120 °C
100	0.451	0.425
200	0.736	0.720
300	1.027	1.015
400	1.348	1.342
500	1.656	1.672

## 5.4 Illustrations

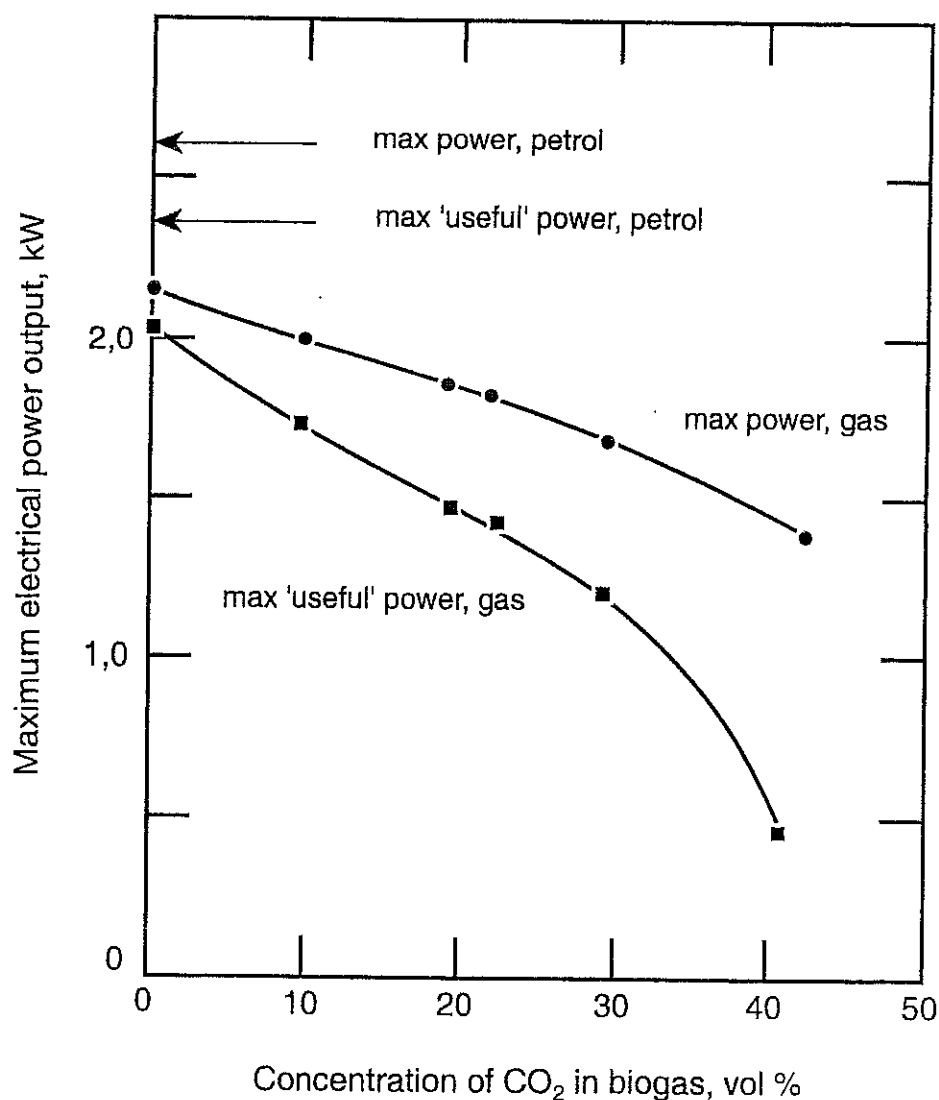
All illustrations (graphs, photographic plates, drawings and diagrams) are referred to as Figures. Each has a number and a descriptive title, which should be placed below the illustration. (See 2.3.6 for referencing architectural drawings). Numbering follows the same principles as those for tables (see 5.3). Thus, the first figure in Chapter 2 is **Figure 2.1**, the second **Figure 2.2** etc. The third figure in Appendix E is **Figure E3**.

### 5.4.1 Graphs

Graphs can take on a number of different forms, eg bar charts, divided circles (pie charts), pictographs, or line graphs. The appearance of a graph is its major attribute. It is therefore up to the writer, in choosing one of these forms, to decide on the impression required. As line graphs are most frequently used in scientific and technical work, attention will be directed primarily to this type. Line graphs are used to show the relationship between a continuously varying independent variable and one or more of its dependent variables. In preparing graphs for inclusion in a thesis the following should be borne in mind:

- the graph should clearly illustrate the point which the writer wishes to make
- the scale should be chosen so that only the relevant parts of the curve are presented, that is, the grid should not be extended unnecessarily beyond the limits of the curve to be shown
- if it is necessary to suppress the zero this should be clearly indicated
- the choice of grid size depends on the accuracy required
- the scale should be easy to read and be restricted to multiples and sub-multiples of 10
- units should be clearly stated and written
- the caption should be brief but self-explanatory and be positioned underneath the graph; any notes or supporting documents, if necessary should be placed below the caption
- to ensure clear reproduction, graphs should not be overburdened with detail.

Fig 5.1 is an example of a good graph



**Figure 5.1** *Effect of carbon dioxide concentration in biogas on power output*

#### 5.4.2 Drawings, diagrams and photographs

Line drawings and diagrams are made up of lines, words and a few special symbols. They must, as far as possible, be kept simple and uncluttered with detail; working drawings are normally not acceptable. Unless they serve to clarify the verbal content of the report, or express an idea more vividly than words can, drawings or diagrams serve no purpose. Only generally accepted graphic symbols should be used.

The inclusion of photographs may occasionally prove useful and sometimes even necessary. As a rule photographs should not be used unless they show something unusual or include features, which cannot easily be expressed in words or by means of line drawings. If they are to be used they should be taken with care. Cluttered backgrounds and view of unrelated equipment should be avoided. Adequate contrast should be provided, and care taken that important details do not fall into shadows or become obscured by the glare of highlights. Some sort of scale should be included so that the size of the object is shown. Lettering on prints may be necessary, but care should be taken to ensure that the letters stand out.

Any illustrative material which cannot effectively be reduced to A4 format, but which is relevant may be included in a pocket on the inside back cover of the volume.

## **6 PRODUCTION OF THE THESIS**

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### **6.1 Word Processing**

#### **6.1.1 Paper**

A good quality white bond paper of A4 size should be used and text must be printed on one side only.

#### **6.1.2 Type layout**

The main body of the text should be set in one and a half or double spacing and generous margins should be allowed. Text should be aligned at a constant distance from the top and bottom of the page, although the top margin of the first page of a chapter may be lowered slightly. (A specimen page layout is shown in Appendix E.)

The following are suggested dimensions of margins:

Top, bottom and right 30mm or 13 spaces

Left: 40mm or 16 spaces (to allow for binding)

All work should be justified to the left margin and should not normally be indented. Avoid right justification of text as it reduces the readability of the thesis. Use a triple space to indicate a new paragraph. (See Section 3 for suggested layout and format of the thesis headings and paragraphs.)

#### **6.1.3 Setting the copy**

Use a clear type such as Elite, Pica, Times Roman, Helvetica or Courier, and italic script or other unusual type faces should generally be avoided unless they are necessary to emphasise words. In this case use italics or bold to emphasise.

## **6.2 Illustrations**

Illustrations form a very important part of a thesis and should be carefully prepared. Whatever method of reproduction is to be used for their presentation in the thesis, the essential requirements are that a table or illustration should be neat, concise, legible and, above all, comprehensible. Originals of photographs are not necessarily required but it is essential that any reproduction of a photograph, such as a photocopy or an electronic scan, be clear.

## **6.3 Number of Copies Required**

For all masters dissertations, research reports and discourses two bound and two unbound copies should be submitted for examination.

For the degree of PhD three bound and two unbound copies of the thesis are required.

## **6.4 Binding**

Three copies of theses and two of dissertations and research reports should be bound, but it is not necessary to have leather or other expensive bindings. Ring bindings are acceptable. The covers of bound theses should be worded simply with the title and below this the first names (given names) and surname (family name) of the author, the degree for which the thesis has been submitted and the year, eg:

BIOGAS-FUELLING OF SMALL ENGINE-ALTERNATOR SET FOR RURAL APPLICATIONS

Robert William Bluff

PhD

2006

## **7 EDITING AND REVISING**

---

### **7.1 Checking, Rectifying and Polishing**

It is the author's responsibility to edit the first draft, and:

- determine the accuracy of the information
- clarify ambiguities
- emphasise important issues
- check spelling

The editing process is essentially one of critical evaluation of the manuscript against the requirements set by the objectives of the research. The main requirements are those of content, or orientation to the reader and of accuracy, brevity and clarity in the functional writing style. The author should evaluate each chapter of the work and check whether it:

- has required content
- is free from inaccuracies, ambiguities and bias
- emphasises important issues and is free from verbosity, irrelevances and unnecessary detail
- can be understood readily
- is appropriate for the purpose.

Before starting the process of checking, rearranging and polishing, the writer should preferably leave the draft for a few weeks so that he/she can mentally switch to the role of a critical reader.

The editing consists of three operations, which should be done separately. These are:

- the integrity edit
- the logical progression edit
- the text and language edit.

### **7.1.1 Integrity edit**

The contents table should be examined and the following points checked:

- are the headings and subheadings clear descriptions of the material covered?
- do they form a recognisably logical pattern and is the numbering system used a reflection of this pattern?

Next the text should be checked page by page for the following:

- are the headings and numbers identical to those used in the list of contents?
- are the tables and figures properly numbered and in sequence, and do they have informative headings and captions?
- are tables, figures and references all, and correctly cited in the text?

### **7.1.2 Logical progression edit**

Each chapter should be examined to:

- check that the objective is clearly stated and that the concluding section shows whether or not the objective was achieved
- check that the logical thread is apparent: any jumps or gaps in the progression are usually an indication of faulty organisation; mark these, but do not correct at this stage



- check in particular whether sections contain anything which does not belong there.

The conclusions list should rise from the discussion. Structural defects must be corrected before the text and language edit.

### **7.1.3 Text and language edit**

Only when one is satisfied with the basic format of the report should one concentrate on the structure of the text and the use of language. The text may include nonverbal components such as graphs and illustrations. These should be evaluated as part of the text.

The criteria for evaluating functional writing, mentioned before, are:

#### **Content criteria**

- accuracy – sufficient for the needs of the reader
- brevity – leaving out irrelevancies and at the same time covering the essentials adequately
- clarity – avoiding vagueness and ambiguity
- emphasis – drawing attention to significant information.

#### **Tonal or attitudinal criteria**

- appropriate to the situation
- concern for the needs of the reader
- serious treatment of subject matter
- authoritative without being writer-centred.

The specific aspects of language usage discussed in Section 4 should be consulted.

## **7.2 Graphic Material**

Essentially the same criteria used in the language edit, namely accuracy, brevity, clarity and emphasis can be applied to graphic communications.

One of the main reasons for using graphics is their ability to give an overall view and show relationships. Any graphic material, which fails in these important areas, probably does not justify the extra effort of using it.

## **7.3 Time and Space Separations**

Most theses are prepared for consideration within a short time. However, once accepted, a thesis becomes part of the body of scientific literature. Writers should therefore draw attention to information that is only valid for a short time. The writer should be aware that points, which are valid locally (eg under Highveld conditions at an altitude of about 1500m) are not necessarily valid generally. For instance, a recommendation to install solar heating panels on north facing roofs will not make sense in the northern hemisphere. Cost data are also subject to variation by place and in time, and monetary exchange rates and other relevant factors may have to be specified to make matters clear.

## **7.4 The External Viewpoint**

The author may feel himself to be objective. Usually he/she is not, to the extent required for a good manuscript. Therefore an external reader's viewpoint is needed. This can be provided by the supervisor or critical colleague who does not have to be an expert in the subject of the manuscript, but who must be able to place himself/herself in the position of the intended audience. He/she should be skilled in recognising the errors authors make and should annotate the manuscript accordingly and, in addition, suggest ways of improving it.

The best manuscripts are produced by a co-operative interaction of author, supervisor and independent editor.

## **7.5 Rewriting**

Of all tasks, rewriting a text is the most unpopular, yet if we wish to develop a clear style it is usually essential.

Editing tends to concentrate on the correction of errors rather than elegance of expression. Rewriting all or a substantial part of the text is usually the only way of getting an elegant well-balanced text.

## **8 LAWS AND REGULATIONS**

### **8.1 Copyright Laws**

Direct quotations from another work are permitted to a reasonable extent for the purposes of research provided that the source and name of the author are acknowledged. Subsequent publication of the thesis as a book necessitates the explicit approval of the copyright holder for this purpose. In this connection, thesis writers should be aware also of University Regulation G.29 (see below).

### **8.2 University Regulations**

The following are the University Regulations pertaining to theses, reprinted from the University Calendar:

#### **G.26 Abstract and style of thesis or dissertation**

The thesis, dissertation or other work prescribed by the rules shall –

- a) Include an abstract of not more than 350 words for a doctoral thesis and not more than 150 words for a master's dissertation  
and
- b) Conform as far as possible to the style and format recommended in the authorised 'Style guide for theses and dissertations' obtainable from faculty offices.

#### **G.27 Copies of thesis or dissertation**

- 1) Subject to any additional or contrary provisions in the rules for any individual degree of master or doctor, a candidate shall submit to the Registrar three bound copies (or four or two if so prescribed by the rules or determined by the Senate), and two further copies unbound, of his/her thesis, dissertation or other work. The bound copies shall be in a form that, in the opinion of the Senate, is suitable for submission to the examiners.

- 2) A candidate for a higher degree shall not be entitled to the return of the copies of the thesis, dissertation or other work, which he/she has submitted for the degree.

### **G.28 Formal declaration**

Together with his/her thesis, dissertation or other work the candidate shall submit a formal declaration stating –

- (a) whether it is his/her own unaided work, or if he/she has been assisted, what assistance he/she has received;
- (b) whether the substance or any part of it has been submitted in the past or is to be submitted for a degree in any university;
- (c) whether any information used in the thesis, dissertation or other work has been obtained by him/her while employed by, or working under the aegis of, any person or organisation other than the University.

### **G.29 Copyright**

While copyright in his/her thesis, dissertation or other work remains vested in the candidate, the University shall have the right to make a reproduction of it or parts of it for a person or institution requiring it for study and research: Provided that not more than one copy is supplied to that person or institution; and to distribute abstracts or summaries of it for publication in indexing and bibliographic periodicals considered by the University to be appropriate.

### **G.30 Acknowledgement of award of degree if the material published subsequently**

A candidate upon whom a higher degree has been conferred by the University and who subsequently publishes or republishes his/her thesis, dissertation or other work, in whole or in part, shall indicate on the title page or in the preface or, if this is not appropriate, in a footnote that such thesis, dissertation or other work has been approved for that degree by the University.

**APPENDIX A**

**SPECIMEN TITLE PAGE**

**BIOGAS-FUELLING OF SMALL ENGINE – ALTERNATOR SET FOR RURAL APPLICATIONS**

Robert William Bluff

A dissertation submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in fulfilment of the requirements for the degree of Master of Science in Engineering.

*(See page 3, 4 & 5 for detailed guidelines on the correct wording of the Thesis Declaration for theses, dissertations and research reports.)*

Johannesburg, 2006

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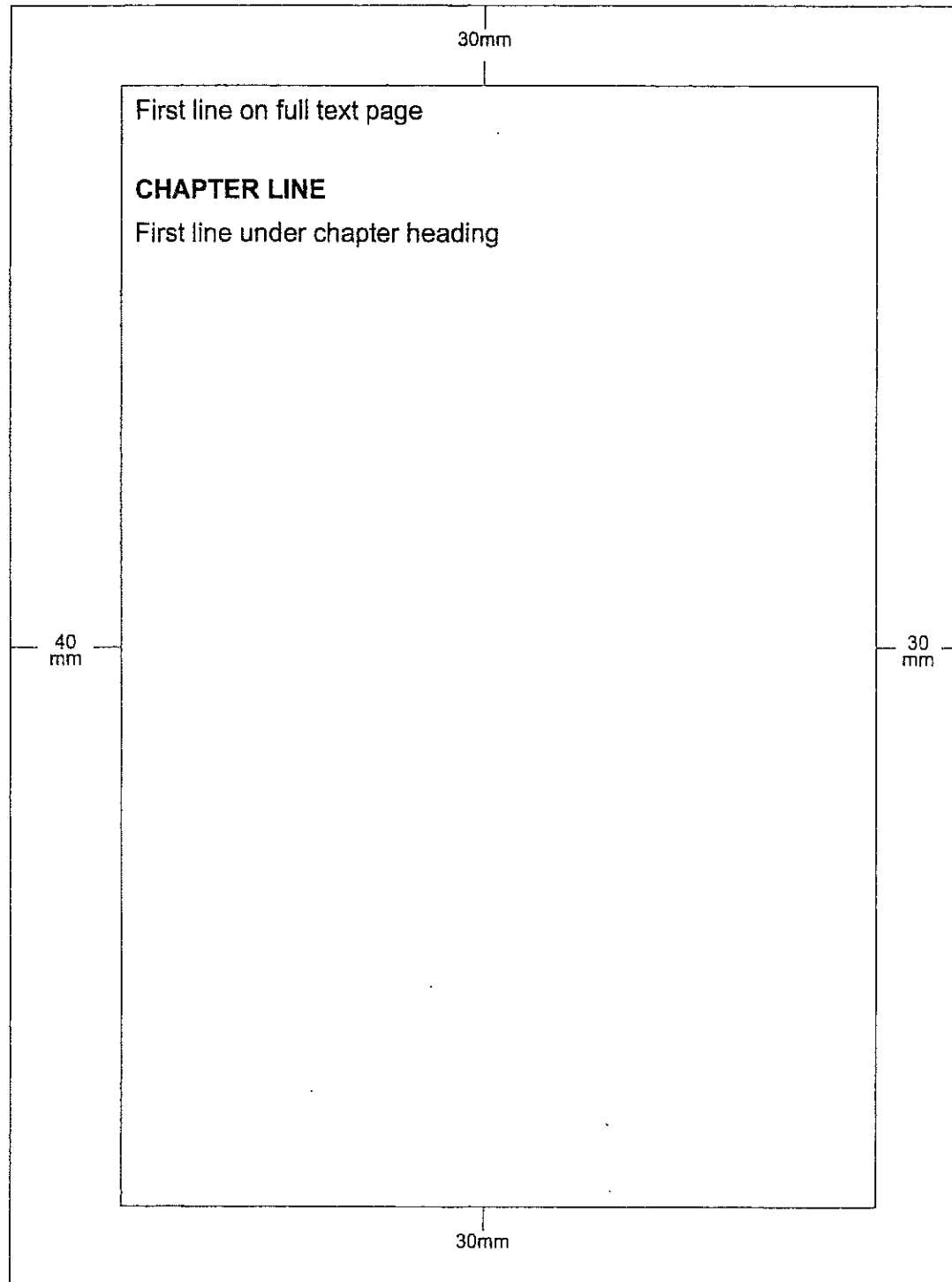
### SPECIMEN LIST OF SYMBOLS

#### LIST OF SYMBOLS

Avogadro constant	L
Boltzmann constant	k
elementary charge (charge on proton)	e
Faraday constant	F
gravitational constant	g
mass of electron	m
molar gas constant	R
Planck constant	h
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## APPENDIX F

### SPECIMEN PAGE LAYOUT



Outer line represents edge of paper; inner one text area.



