



AIR FORCE RESEARCH LABORATORY

**AMERICAN NATIONAL STANDARD INSTITUTE / NATIONAL
INFORMATION STANDARDS ORGANIZATION
(ANSI/NISO)**

STANDARD Z39.18-2005

**SCIENTIFIC AND TECHNICAL REPORTS-PREPARATION,
PRESENTATION AND PRESERVATION**

FORMAT GUIDELINES

JUNE 2010

The United States Air Force uses ANSI NISO Z39.18 as a guide for all technical reports. AFRL uses this subset of the ANSI standard to highlight important guidance addressed in the ANSI standard as outlined below. Full component descriptions are available in the ANSI NISO Z39.18.

COMPONENTS OF A TECHNICAL REPORT

	POC	Inclusion Status
Front Matter – numbered sequentially with Roman numerals beginning with Table of Contents		
Cover or Title	Government WUM (Contractor has a placeholder version)	Required
Notice and Signature Page	Government WUM	Required
Notice to Accompany the Dissemination of Export-Controlled Technical Data	Government WUM	Required , if applicable
SF298, Report Documentation Page (Contains Abstract)	Report Author	Required
Table of Contents	Report Author	Required
List(s) of Figures and Tables	Report Author	Conditional (include when there are more than 5 figures and/or tables)
Foreword	Report Author	Optional
Preface	Report Author	Optional
Acknowledgements	Report Author	Optional

Body – numbered sequentially beginning with the Arabic numeral 1		
Summary	Report Author	Required
Introduction	Report Author	Required
Methods, Assumptions, and Procedures	Report Author	Required
Results and Discussion	Report Author	Required
Conclusions	Report Author	Required
Recommendations	Report Author	Conditional (include when purpose of report is to suggest a course of action)
References	Report Author	Conditional (use if references are provided)

Back Matter – numbering continues sequentially from body of report		
Appendices	Report Author	Conditional (Include when needed to supplement Results and Discussion)
Bibliography	Report Author	Conditional
List of Symbols, Abbreviations, and Acronyms	Report Author	Conditional (include if used in any other component of the report)
Glossary of Terminology	Report Author	Conditional (Include if report incorporates terms unfamiliar to the intended audience)
Index	Report Author	Optional
Distribution List	Report Author/Government WUM	Conditional (Some technology directorates control access)
Back Cover	Report Author	Required for classified reports only

FORMAT REQUIREMENTS:

1.0 TYPE (FONT) AND HEADS (CHAPTER TITLES)

The preferred type (font) is 12-point Times New Roman or Arial. The following is an example (format and spacing) of heads:

1.0 FIRST-ORDER HEAD IS ALL CAPS, FLUSH LEFT AND BOLDED

1.1 Second-Order Head is Bolded, Same Font Size as Text, Caps and Lower Case, Flush with Left Margin

Insert one blank line between head and text then begin copy.

1.1.1 Third-Order Head is Flush Left, Boldface, Caps and Lower Case Letters, Followed by a Period. Then continue the copy.

2.0 SPACING

Final reports should be single spaced. It isn't necessary to double-space between paragraphs if the first line of each paragraph is indented.

3.0 MARGINS

Leave **one-inch left, right, and top margins**. *Page number should be centered and located one-half inch (1/2") from bottom of page.* This is accomplished in page setup, Margins - bottom - 1", Layout – Footer .7". Leave enough room at the bottom of each page to include applicable restrictive statements.

4.0 NUMBERING

Page numbers are centered at bottom of page. Figure numbers are centered **below** Figure, with caption centered either on the line below Figure number or on the same line as Figure number. Table numbers are centered **above** Table on the same line as Table caption, and Equations are numbered on right margin across from Equation.

Number Pages, Figures, Tables, and Equations sequentially, not by section.

5.0 PRESENTATION STYLES

5.1 All figures, tables, equations, and line drawings shall be crisp and easy to read. Figure letters and numbers (callouts) should be in at least an 8-point type (handwriting on figures is not acceptable). Figures and tables in the table of contents are numbered, worded, spelled and punctuated exactly as they are in the report.

5.2 Style for Equations:

$$E = mc^2 \quad (1)$$

$$\phi_{\text{det}} = L_e \times \Omega_{\text{det}} \times v_n(D, \hat{i}) \cdot \pi D^2 dD \quad (2)$$

5.3 Style for Figure Captions

Callouts (labels) should be in Upper and Lower case type, not all caps, bolded, no periods.

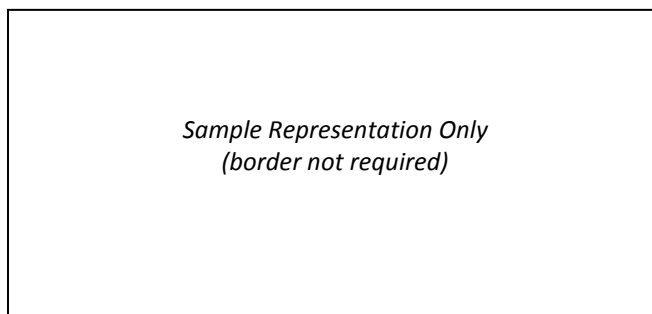
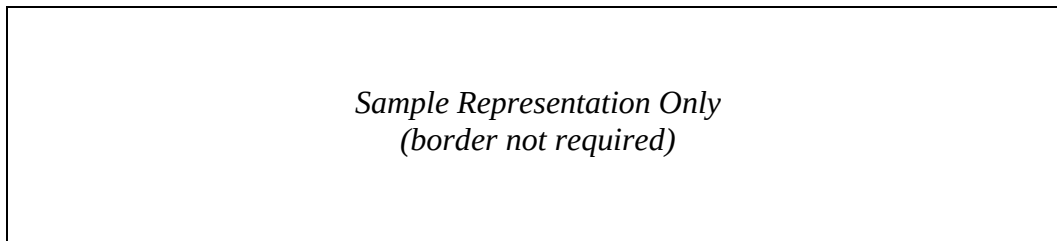


Figure 1. Figure Caption May be on Same Line as Figure Number

5.3.1 The figure caption describes the content without giving background information, results, or comments about the figure. Reference to Figures and Tables must appear in text **before** actual Figure or Table appears in report. Where possible, integrate Figures and Tables into text and place Figure/Table as soon after the first mention of it as possible, before beginning a new subject. There should be two blank lines between Figures or Tables and text.

5.4 Style for Table Captions (authors should use the style listed in para 5.3 above)

Table 1. Title Line and Number All in One Line, Centered or Flush Left, Bolded, (No Periods)



6.0 FRONT MATTER

The **Cover Page** is followed by the appropriate **Notice Page(s)**, after which is the **SF298**. Then there should be the three sections (with page numbers listed in lower-case Roman numerals, beginning with Roman numeral i), **Table of Contents**, followed by **List of Figures**, and **List of Tables**.

6.1 Instructions for Standard Form 298

Contractor/Author shall complete Blocks 1– 5b, 6-8, 12-15 of the SF 298 and submit per CDRL requirements.

6.2 Table of Contents

Start pagination of Table of Contents with lower-case Roman numeral i. Start listing contents that are in front matter, e.g. List of Figures, List of Tables, Foreword, Preface, then body of text, then back matter. Appendices should be numbered sequentially from the last page of the report. If there's only one Appendix, just call it an Appendix. Example (border not required):

TABLE OF CONTENTS	
Section	Page
List of Figures	iv
List of Tables	v
1.0 SUMMARY	1
2.0 INTRODUCTION	3
3.0 METHODS, ASSUMPTIONS, AND PROCEDURES	4
3.1 High Symmetry Hypervalent Structures (OF ₆)	7
3.2 Azide-like Structures	9
3.2.1 N(N ₃) ₃ , HN(N ₃) ₂ , N(N ₃) ₂ ⁻ and N(N ₃) ₄ ⁺	12
4.0 RESULTS AND DISCUSSION	15
5.0 CONCLUSIONS	35
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APPENDIX A - Publications and Presentations	40
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LIST OF SYMBOLS, ABBREVIATIONS, AND ACRONYMS	59
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6.3 List of Figures

Continue pagination with lower-case Roman numerals. List all Figures found in text (not Figs. in Appendix, if any, those will be listed separately in front of the Appendix). Example (border not required):

LIST OF FIGURES	
Figure	Page
1 Overall View of Propulsion Vehicle.....	3
2 Motor Configuration.....	6
3 Apparatus Used to Make Nozzle Tubes.....	7

6.4 List of Tables

Continue pagination with lower-case Roman numerals. List all Tables found in text (not Tables in Appendix, if any, those will be listed separately in front of the Appendix). Example (border not required):

LIST OF TABLES	
Table	Page
1 Some of the Upper-Stage Propulsion Options.....	19
2 Results of Test Firing #1.....	25
3 Results of Test Firing #2.....	26

7.0 BODY

Next, start body of text with **Summary** and begin pagination with Page 1 (Arabic numerals). This may be accomplished by inserting a Section Break and start the pagination with 1. Follow with **Introduction, Methods, Assumptions, and Procedures, Results and Discussion, Conclusions**, then **References**, to be followed by the appropriate **Back Matter**.

7.1 References

References should be listed numerically, in the order they appear in the text. The Reference page should be at the end of the report (not at the end of each section).

For works that are generally referred to throughout the report, without citing specific references from the work, create a Bibliography (in alphabetical order). Personal communications, unpublished speeches, or any other information not available for reference by the reader should not be included in the References – footnote your citation instead. References must be available to readers of the report.

References are prepared according to the accepted practice of the discipline of the primary author/creator of the report. The examples below are a suggested format.

7.1.1 Papers / Journal Articles / Conference Presentations or Proceedings

Author's last name, then first

Titles of papers are in quotation marks

Journal names or Conference names are in *italics*

Volume is **bolded**

Date follows comma (not within parenthesis)

Page numbers (pp.) are last.

Examples:

Author(s), "Title of Article," *Journal Name (italics)*, **19**, 628, Jun 1993 pp. _-_.
Chidambaram, N., Dash, S., and Kenzakowski, D., "Scalar Variance Transport in the

Turbulence Modeling of Propulsive Jets," *Journal of Propulsion and Power*, Vol. 17, No. 1, pp. 79-84, 2001.

Author(s), "Title of Article," Paper No. (if AIAA or CPIA paper, etc.), *Name of Conference*, Location, Date.

Chai, A.H., Cao, Z.T., Chen, H. P., "Monte Carlo Method Study of Terahertz Pulse Propagation in Biological Tissue," *Proceedings of the 2005 IEEE, EMBS 27th Annual Conference*, Shanghai China, (2005).

7.1.2 URLs The URL or other path information appears instead of the volume and number cited for a conventional journal. It is frequently useful to the reader to know the date when the material was accessed. In such cases, "Accessed [date]" would be appropriate wording.

Virillio, Paul, "Speed and Information: Cyberspace Alarm!" CTHEORY, URL:
<http://www.freedonia.com/ctheory/>, last modified September 19, 1995. Accessed November 17, 1999.

7.1.3 Technical Reports

Author's last name, then first

Titles of reports are in *italics*

Next is report number

Name and address of performing agency/organization

Date is last.

Example:

Author(s), *Title*, AFRL-PR-ED-TR-20XX-XXXX, Company, Inc., City, ST, Jan 2006.

Gaitonde, Datta, *Advances in High-Fidelity Multiphysics Simulation*, AFRL-RB-WP-TR-2008-3019, Wright-Patterson AFB: AFRL Air Vehicles Directorate, 2008.

Gaitonde, Datta, *Advances in High-Fidelity Multiphysics Simulation*, AFRL-RB-WP-TR-2008-3019; ADB123456, Wright-Patterson AFB: AFRL Air Vehicles Directorate, 2008.

7.1.4 Books

Author's last name, then first

Title of book can be **Bolded** or Underlined

Publisher's name and address

Date of publication

Page numbers last

Example:

Author(s), **Book Title**, Harper & Rowe, New York, NY, 1993, pp. 36-38, 77, 98-101.

Wylie, C.R., **Advanced Engineering Mathematics**, 7th ed, New York: McGraw-Hill, 2005.

8.0 BACK MATTER

Pagination continues from the body. Include conditional and optional back matter in the order listed in the components table on page 2: Appendices, Bibliography, List of Symbols, Abbreviations, and Acronyms, Glossary, Index, Distribution List, and Back Cover.

8.1 Appendices

If there is only one appendix, titled Appendix, all tables and figures in that appendix are prefixed with A-, the "A" representing the word, Appendix.

Each appendix should be referred to in the body text. Any references cited in an appendix must be listed as the last page of the appendix. Appendix page numbering is a sequential continuation of the Arabic text page numbering.

Number figures, tables, equations, and references in an appendix with the letter of the appendix, followed by a hyphen and a sequential number, starting at 1, e.g., Figure A-1. An Appendix Figure; Table A-1. An Appendix Table; and for reference citations, [A-1].

8.2 Symbols, Abbreviations and Acronyms

When first introduced in the report (title or text), completely write out abbreviations and acronyms, followed by the abbreviation or acronym in parentheses, and subsequently use only the acronym/abbreviation in the body text ; i.e. Small Business Innovation Research (SBIR).

Create an acronym list that lists and defines all acronyms and symbols that appear in your report. List all terms alphabetically, beginning with those starting with capital letters, followed by lower case (e.g., H₂, HEDM, hcp). Follow alphabetical entries with Greek or special symbols. Capitalize definitions only if they are proper names (e.g. Department of Defense).

Example (border not required):

LIST OF SYMBOLS, ABBREVIATIONS AND ACRONYMS	
CAT	computerized axial tomography
COMSAT	Communication Satellites
DMP-128	a Polaroid™ photopolymer
DoD	Department of Defense
dcg	dichromated gelatin
H ₂	hydrogen
HEDM	High Energy Density Matter
∇	angle of attack

The words “Figure,” “Reference,” and “Equation” should be written out in text, but abbreviated when used within parentheses. Months are abbreviated to three letters without punctuation (e.g., Jun, Jul, Aug). Units of measurement are abbreviated (e.g., 12 cm, 50 l, 20 lb, 1 atm, 30 sec, 200 psig) without punctuation – except for “in.” (inches), which may be followed by a period to distinguish it from the preposition – and are generally singular.

For a complete list of abbreviations, see Chapter 9 of the *GPO Style Manual*
<http://www.gpoaccess.gov/stylemanual/browse.html>.

9.0 INSTRUCTIONS FOR SUBMITTAL

Follow your Contract Data Requirements List (CDRL) for submission instructions. If your CDRL requires delivery of the final technical report on CD-ROM, ensure it is marked as follows:

CD-ROMs shall have the following items legibly printed on top of the disk:

1. Contract Number and Program Name.
2. CDRL numbers referenced and Title of Data Items.
3. Date.
4. Company Logo/ Nomenclature.
5. Distribution Statement, export control warning notice (when applicable).

REPORT DOCUMENTATION PAGE				<i>Form Approved</i> <i>OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
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13. SUPPLEMENTARY NOTES					
14. ABSTRACT Required					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES Required	19a. NAME OF RESPONSIBLE PERSON
a. REPORT Required	b. ABSTRACT Required	c. THIS PAGE Required			19b. TELEPHONE NUMBER (include area code)

INSTRUCTIONS FOR COMPLETING SF 298

1. REPORT DATE. Full publication date, including day, month, if available. Must cite at least the year and be Year 2000 compliant, e.g. 30-06-1998; xx-06-1998-, xx-xx-1998.

2. REPORT TYPE. State the type of report, such as final, technical, interim, memorandum, master's thesis, progress, quarterly, research, special, group study, etc.

3. DATES COVERED. Indicate the time during which the work was performed and the report was written, e.g., Jun 1997 - Jun 1998; 1-10 Jun 1996; May - Nov 1998; Nov 1998.

4. TITLE. Enter title and subtitle with volume number and part number, if applicable. On classified documents, enter the title classification in parentheses.

Ba. CONTRACT NUMBER. Enter all contract numbers as they appear in the report, e.g. F33615-86-C-5169.

5b. GRANT NUMBER. Enter all grant numbers as they appear in the report, e.g. AFOSR-82-1234.

5c. PROGRAM ELEMENT NUMBER. Enter all program element numbers as they appear in the report, e.g. 61101A.

5d. PROJECT NUMBER. Enter all project numbers as they appear in the report, e.g. 1F665702D1257; ILIR.

5e. TASK NUMBER. Enter all task numbers as they appear in the report, e.g. 05; RF0330201; T4112.

5f. WORK UNIT NUMBER. Enter all work unit numbers as they appear in the report, e.g. 001; AFAPL30480105.

6. AUTHOR(S). Enter name(s) of person(s) responsible for writing the report, performing the research, or credited with the content of the report. The form of entry is the last name, first name, middle initial, and additional qualifiers separated by commas, e.g. Smith, Richard, J, Jr.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES). Self-explanatory.

8. PERFORMING ORGANIZATION REPORT NUMBER.

Enter all unique alphanumeric report numbers assigned by the performing organization, e.g. BRL-1234; AFWL-TR-85-4017-Vol-21-PT-2.

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES).

Enter the name and address of the organization(s) financially responsible for and monitoring the work.

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11. SPONSOR/MONITOR'S REPORT NUMBER(S).

Enter report number as assigned by the sponsoring/monitoring agency, if available, e.g. BRL-TR-829; -21 5.

12. DISTRIBUTION/AVAILABILITY STATEMENT. Use agency-mandated availability statements to indicate the public availability or distribution limitations of the report. If additional limitations/ restrictions or special markings are indicated, follow agency authorization procedures, e.g. RD/FRD, PROPIN, ITAR, etc. Include copyright information.

13. SUPPLEMENTARY NOTES. Enter information not included elsewhere such as: prepared in cooperation with; translation of; report supersedes; old edition number, etc.

14. ABSTRACT. A brief (approximately 200 words) factual summary of the most significant information.

15. SUBJECT TERMS. Key words or phrases identifying major concepts in the report.

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