

American Nuclear Society

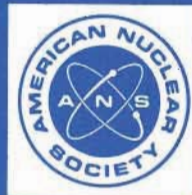
WITHDRAWN

**April 14, 2005
ANSI/ANS-10.3-1995**

documentation of computer software

an American National Standard

No longer being maintained as an American National Standard. This standard may contain outdated material or may have been superseded by another standard. Please contact the ANS Standards Administrator for details.



published by the
American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60525 USA

This is a preview of "ANSI/ANS-10.3-1995". [Click here to purchase the full version from the ANSI store.](#)

**American National Standard
for Documentation of Computer Software**

Secretariat
American Nuclear Society

Prepared by the
**American Nuclear Society
Standards Committee
Working Group ANS-10.3**

Published by the
**American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60525 USA**

Approved April 14, 1995
by the
American National Standards Institute, Inc.

American National Standard

Designation of this document as an American National Standard attests that the principles of openness and due process have been followed in the approval procedure and that a consensus of those directly and materially affected by the standard has been achieved.

This standard was developed under procedures of the Standards Committee of the American Nuclear Society; these procedures are accredited by the American National Standards Institute, Inc., as meeting the criteria for American National Standards. The consensus committee that approved the standard was balanced to ensure that competent, concerned, and varied interests have had an opportunity to participate.

An American National Standard is intended to aid industry, consumers, governmental agencies, and general interest groups. Its use is entirely voluntary. The existence of an American National Standard, in and of itself, does not preclude anyone from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard.

By publication of this standard, the American Nuclear Society does not insure anyone utilizing the standard against liability allegedly arising from or after its use. The content of this standard reflects acceptable practice at the time of its approval and publication. Changes, if any, occurring through developments in the state of the art, may be considered at the time that the standard is subjected to periodic review. It may be reaffirmed, revised, or withdrawn at any time in accordance with established procedures. Users of this standard are cautioned to determine the validity of copies in their possession and to establish that they are of the latest issue.

The American Nuclear Society accepts no responsibility for interpretations of this standard made by any individual or by any ad hoc group of individuals. Requests for interpretation should be sent to the Standards Department at Society Headquarters. Action will be taken to provide appropriate response in accordance with established procedures that ensure consensus on the interpretation.

Comments on this standard are encouraged and should be sent to Society Headquarters.

Published by

**American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60525 USA**

Copyright © 1995 by American Nuclear Society. All rights reserved.

Any part of this standard may be quoted. Credit lines should read "Extracted from American National Standard ANSI/ANS-10.3-1995 with permission of the publisher, the American Nuclear Society." Reproduction prohibited under copyright convention unless written permission is granted by the American Nuclear Society.

Printed in the United States of America

Foreword

(This Foreword is not a part of American National Standard for Documentation of Computer Software, ANSI/ANS-10.3-1995.)

This standard supersedes and is a revision of American National Standard Guidelines for the Documentation of Digital Computer Programs, ANSI/ANS-10.3-1986. These documents were prepared by Subcommittee ANS-10 of the Standards Committee of the American Nuclear Society (ANS). This subcommittee is sponsored by the Mathematics and Computation Division of the Society. Since its inception, the Mathematics and Computation Division has encouraged and promoted the interchange of computer software within the nuclear industry. The guidelines recommended herein are based on experience in working with neutronics, shielding, and engineering applications in this industry.

This standard addresses the documentation of engineering and scientific software. Good documentation promotes understanding, reduces duplication of effort, eases conversion to different computer environments, and facilitates extension to other applications. Good documentation is essential for effective implementation and use of computer software.

The intention of this standard is to encourage better communication between the developer and the user; it should be regarded as a guide rather than a set of rigid specifications. As a guide, it is sufficiently comprehensive to apply to large-scale programs and for software intended for extensive external use. Not all features of this document are appropriate in all circumstances. For example, software in the initial experimental stage would not be expected to require the extensive documentation suggested in this standard. The degree of conformance is a matter of judgment and must be established for each individual situation by the management of the development effort. In general, as the project complexity increases so does the need for more complete documentation. Most software development organizations will have additional documentation requirements which extend this standard.

Documentation requirements for on-line monitoring, control, and safety systems are not covered in this standard.

This standard is one of four documents directed toward individuals who develop computer programs. The other three are American National Standard Recommended Programming Practices to Facilitate the Portability of Scientific and Engineering Computer Programs, ANSI/ANS-10.2-1988; American National Standard Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry, ANSI/ANS-10.4-1987; and American National Standard for Accommodation of User Needs in Computer Program Development, ANSI/ANS-10.5-1994. These standards are under continual maintenance by ANS-10. The user is advised to review the current versions of these standards for possible changes.

This standard was drafted by Working Group ANS-10.3 of Subcommittee ANS-10, Mathematics and Computation. The membership of ANS-10.3, at the time of its approval of this standard, was as follows:

G. C. Main, Chair, *BCS-Richland, Inc.*
M. K. Butler, *Argonne National Laboratory*
S. D. Harris, *Science Applications International Corporation*
B. L. Kirk, *Oak Ridge National Laboratory*
L. I. Kopp, *U.S. Nuclear Regulatory Commission*
G. W. Main, *JMJ Associates*
A. O. Smetana, *Westinghouse Savannah River Company*

Members of ANS-10 at the time this standard was approved were:

S. Hartzell, Chair, *Power Computing*
R. J. Breen, *Electric Power Research Institute*
M. K. Butler, *Argonne National Laboratory*
J. S. Dukelow, *Battelle Pacific NW Laboratory*

S. D. Harris, *Science Applications International Corporation*
B. L. Kirk, *Oak Ridge National Laboratory*
L. I. Kopp, *U.S. Nuclear Regulatory Commission*
G. C. Main, *BCS-Richland, Inc.*
G. W. Main, *JMJ Associates*
N. H. Marshall, *EG&G Idaho, Inc.*
J. E. Olhoeft, *Westinghouse Electric Corporation*
A. O. Smetana, *Westinghouse Savannah River Company*

The Consensus Committee N-17, Research Reactors, Reactor Physics, Radiation Shielding, and Computational Methods, had the following membership at the time it reviewed and approved this standard:

T. M. Raby, Chairman
A. Weitzberg, Secretary

J. D. Buchanan Individual
A. D. Callihan Individual
R. E. Carter Individual
D. Cokinos Brookhaven National Laboratory
A. De La Paz Vista Technologies
D. Duffey American Institute of Chemical Engineers
H. Goldstein American Physical Society
S. Hartzell Power Computing Company
P. B. Hemmig U. S. Department of Energy
 J. W. Lewellen (Alt.)
W. A. Holt American Public Health Association
W. C. Hopkins Bechtel Corporation
J. E. Hyder Health Physics Society
 A. G. Johnson (Alt.)
L. I. Kopp Individual
J. Miller Institute of Electrical and Electronics Engineers, Inc.
J. E. Olhoeft Individual
T. M. Raby American Nuclear Society
W. J. Richards U. S. Department of Defense
M. M. Ter Pogossian American College of Radiology
J. F. Torrence National Institute of Standards and Technology
D. K. Trubey Individual
S. H. Weiss U. S. Nuclear Regulatory Commission
 A. Adams Jr. (Alt.)
A. Weitzberg Halliburton NUS Corporation
W. L. Whittlemore GA Technologies, Inc.

Contents	Section	Page
	1. Scope and Objective	1
	1.1 Scope	1
	1.2 Objective	1
	2. Definitions	1
	3. Introduction	1
	4. Software Abstract	2
	5. Application Information (User's Manual)	2
	5.1 Description	2
	5.2 Program Considerations	2
	5.3 External Data Files	3
	5.4 Input Data	3
	5.4.1 General Considerations	3
	5.4.2 Specifications for Input Variables	3
	5.5 System Control Requirements	3
	5.6 Output Information	3
	5.7 Sample Problems	3
	5.7.1 Selection	3
	5.7.2 Output	3
	5.7.3 Resource Usage	3
	6. Problem or Function Definition	3
	6.1 Description	3
	6.2 Algorithms and Numerical Techniques	4
	6.3 Data Libraries	4
	6.4 Validation	4
	7. Programming Information	4
	7.1 Source Program	4
	7.1.1 Source Language(s)	4
	7.1.2 Diagrams	4
	7.1.3 Areas of Dependency	4
	7.1.4 Program and Subprogram Details	4
	7.2 Details of Data Files	4
	7.2.1 File Names	4
	7.2.2 Procedures	5
	7.2.3 Logical Devices	5
	7.3 Program Implementation Requirements	5
	7.3.1 Hardware	5
	7.3.2 Software	5
	7.3.3 Programming Considerations	5
	7.4 External Considerations	5
	8. Software Package and Transmittal Material	5
	8.1 Software Package	5
	8.2 Transmittal Material	6

9. Installation Environment Report	6
9.1 Computer Hardware	6
9.2 System Software	6
10. References	6

Documentation of Computer Software

1. Scope and Objective

1.1 Scope. This standard addresses the documentation of computer software prepared for scientific and engineering applications.

1.2 Objective. The standard seeks to facilitate effective selection, usage, transfer, conversion, and modification of computer software that may be used in the nuclear industry.

2. Definitions

The definitions given below are applicable specifically to this standard.

algorithm. A well-defined procedure or process for the solution of a problem to a specified degree of accuracy in a finite number of steps.

benchmark problem. A well-defined problem with an analytic or generally-accepted solution which has been published and can serve as a validated reference point. Note that in some nuclear applications the fact that a solution is generally accepted or published is not sufficient. It must also be defensible, reproducible, and verified by an independent, qualified reviewer.

computer program. An identifiable series of instructions, or statements, in a form suitable for execution by a computer and designed to achieve a certain result.

computer environment. The computer hardware and system software (e.g., compiler, operating system, graphical user interface) that supports and is utilized by a computer program and that can affect its design and operation.

computer software. Computer programs and associated procedures, rules, and documentation.

default value. The value assigned to a variable by a program when its value is not specified by the user.

external data files. The data files which exist prior to or after execution of a computer program. They include:

library files - Used to retain commonly accepted data in a standardized form.

interface files - Used to share data between programs or subprograms.

restart files - Used to retain data between successive executions of the same program.

installation environment report. Documentation of the system software and hardware devices operational at an installation.¹

logical device. The designated medium for the storage or transfer of data files. At execution time logical devices are assigned to physical devices.

software package. Aggregate of all elements required for implementation or use of the software.²

3. Introduction

This standard addresses the content rather than the form of software documentation. It describes the four essential parts of documentation. The parts are the abstract, the application information, the problem or function definition, and the programming information. The abstract is directed to the potential user. The application information is directed to the individual user concerned with the execution of the software to obtain results for a specific problem. Problem definition information is directed to those interested in the mathematical models and algorithms on which the software is based. The programming information section is directed to the programmer

¹ Typical contents of an installation environment report are described in Section 9, Installation Environment Report.

² Typical contents of a software package are described in Section 8, Software Package and Transmittal Material.