

# American Nuclear Society

**portability of scientific  
and engineering software**

## an American National Standard

This standard has been reviewed and reaffirmed with the recognition that it may reference other standards and documents that may have been superseded or withdrawn. The requirements of this document will be met by using the version of the standards and documents referenced herein. It is the responsibility of the user to review each of the references and to determine whether the use of the original references or more recent versions is appropriate for the facility. Variations from the standards and documents referenced in this standard should be evaluated and documented.

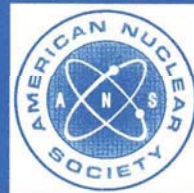
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# REAFFIRMED

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**ANSI/ANS-10.2-2000**

**American National Standard  
for Portability of Scientific  
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## **American National Standard**

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**Foreword** (This Foreword is not a part of American National Standard for Portability of Scientific and Engineering Software, ANSI/ANS-10.2-2000.)

This standard is directed primarily at the computer-independent aspects of digital computer software. That is, the developer is asked to accept the fact that many of the difficulties associated with the portability of computer software can be avoided. Unnecessary expense, wasted effort, and loss of computing capability have occurred because the practices recommended in this standard have not usually been assigned sufficient importance. This is true not only in program conversion between installations but also in program modification and conversion within the originating installation. Some of the recommendations herein cover elementary practices normally followed, yet often overlooked. They can be put into practice with a reasonable amount of additional effort over that normally expended in the development of software.

This standard and the ANS standards listed below provide one source of information for developing software. Additional sources of information on software development may be found in numerous books and other software engineering standards and guides (from organizations such as IEEE, ISO, and IEC). In general, the better the software is engineered, the more portable it will be.

This standard complements the following ANS-10 standards relating to computer software development:

*ANSI/ANS-10.3-1995, American National Standard for Documentation of Computer Software*

*ANSI/ANS-10.4-1987, American National Standard Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry*

*ANSI/ANS-10.5-1994, American National Standard for Accommodating User Needs in Computer Program Development*

This standard has been written by Working Group ANS-10.2 of the American Nuclear Society's Standards Committee. The membership of this group during the preparation of the final draft consisted of:

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# Portability of Scientific and Engineering Software

## 1. Scope and Objectives

**1.1 Scope.** This standard provides recommended programming practices and requirements to facilitate the portability of computer programs prepared for scientific and engineering computations.

**1.2 Objectives.** The objective of this standard is to recommend programming practices that will simplify the implementation, conversion, and modification of computer programs on various hardware/software configurations.

## 2. Definitions

The following definitions are applicable specifically to this standard.

**conversion.** Modification of existing software to enable it to operate with similar functional capability in a different hardware/software environment.

**guidelines.** Particular provisions that are considered good practice but which are not mandatory in programs intended to comply with this standard. See "shall, should, and may". This definition is taken from American National Standard Quality Assurance Program Requirements for Nuclear Facilities, ANSI/ASME NQA-1-1986 [1].

**implementation.** The installation and demonstration of operability of a computer program on a given hardware/software configuration.

**localization.** The isolation of related tasks, each of which relates to performance of a well-defined function, within a single subprogram.

**modification.** Any change to software.

**portability.** The ability of a computer program to be transferred from one hardware/software configuration and implemented on another with little or no modification, such that the capability of the program is not altered during the transfer.

**shall, should, and may.** The word "shall" is used to denote a requirement; the word "should" to denote a recommendation; and the word "may"

to denote permission, neither a requirement nor a recommendation.

**subprogram.** A function, subroutine, method, class, module, package, or other language-defined program unit.

## 3. Introduction

This standard provides recommendations and requirements to help the programmer create software that is easily portable. These guidelines also provide good programming practices that are useful even when writing programs that are not expected to be transmitted out of the developer's organization. Such practices can reduce the effort required for the inevitable, and not infrequent, change to a different computer system or transfer of personnel responsibilities within the same organization. For related guidelines on documentation and user needs, refer to the following American National Standards:

Documentation of Digital Computer Programs, ANSI/ANS-10.3-1995 [2].

Guidelines for the Verification and Validation of Scientific Computer Programs for the Nuclear Industry, ANSI/ANS-10.4-1987 (R1988) [3].

Accommodating User Needs in Computer Program Development, ANSI/ANS-10.5-1994 [4].

The Institute of Electrical and Electronics Engineers (IEEE) and the International Standards Organization (ISO) provide additional software development standards and guides.

The techniques used to achieve ease of use or the most efficient and economical execution of the software on a given computer system can restrict program portability. The merging of these somewhat opposing goals may require a compromise for the individual's situation.

Few organizations can afford to originate and develop all of their needed computer programs. From an economic standpoint, most organizations tend to acquire programs from outside sources and tailor them to their own needs. This standard applies to any implementation, conver-