

BUREAU OF INDIAN STANDARDS
DRAFT FOR COMMENTS ONLY

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Draft Indian Standard

**Information technology — Programming languages —
Fortran Part 1: Base language**

(Second Revision)

मसौदा भारतीय मानक

सूचना प्रौद्योगिकी - प्रोग्रामिंग भाषाएँ - फोरट्रान भाग 1: मूल भाषा
(दूसरा संशोधन)

ICS: 35.060

LITD 15: Data Management System

Last date for comments: 19 Aug 2023

NATIONAL FOREWORD

(Formal clauses will be added later)

This Draft Indian Standard which is identical with ISO/IEC DIS 1539-1 'Information technology — Programming languages — Fortran — Part 1: Base language' issued by ISO 'International Organization Standardization' and IEC 'International Electrotechnical Commission' will be adopted by the BIS, on the recommendation of the Data Management System Sectional Committee, LITD 15 and approval of the Electronics and Information Technology division.

This standard was originally published in 1983 as IS 10680: 1983 and was identical to ISO 1539 - 1980. This first revision of this standard was published in 2016 as IS 10680 (Part 1) : 2016 and was identical to ISO/IEC 1539-1 : 2010. The Second revision of the Indian Standard has been taken up to align it with the latest version of ISO/IEC DIS 1539-1 (currently under final stage of publication).

This edition contains the following changes:

- Source form:

The maximum length of a line in free form source has been increased. The maximum length of a statement has been increased. The limit on the number of continuation lines has been removed.

- Data declaration:

A data object with a coarray component can be an array or allocatable. BIND(C) ENUM are now referred to as interoperable enumerations, and noninteroperable enumeration types are available. An interoperable enumeration can be given a type name. TYPEOF and CLASSOF type specifiers can be used to declare one or more entities to have the same type and type parameters as another entity. A PUBLIC namelist group can have a PRIVATE namelist group object. The DIMENSION attribute can be declared with a syntax that does not depend on the rank (8.5.8, 8.5.17).

- Data usage and computation:

Binary, octal, and hexadecimal literal constants can be used in additional contexts. A deferred-length allocatable errmsg-variable is allocated by the processor to the length of the explanatory message. An ALLOCATE statement can specify the bounds of an array allocation with array expressions. A pointer assignment statement can specify lower bounds or rank remapping with array expressions. Arrays can be used to specify multiple subscripts or subscript triplets (9.5.3.2). Conditional expressions provide selective evaluation of subexpressions.

- Input/output:

The AT edit descriptor provides output of character values with trailing blanks trimmed. The LEADING_-ZERO= specifier in the OPEN and WRITE statements, and the LZF, LZS and LZ

control edit descriptors, provide control of optional leading zeros during formatted output. A deferred-length allocatable iomsg- variable is allocated by the processor to the length of the explanatory message. A deferred-length allocatable io-unit in a WRITE statement is allocated by the processor to the length of the record to be written.

- Execution control:

The REDUCE locality specifier for the DO CONCURRENT construct specifies reduction variables for the loop. The NOTIFY WAIT statement, NOTIFY= specifier on an image selector, and the NOTIFY_TYPE from the intrinsic module ISO_FORTRAN_ENV provide one-sided data-oriented synchronization between images.

- Intrinsic procedures:

The intrinsic functions ACOSD, ASIND, ATAND, ATAN2D, COSD, SIND, and TAND are trigonometric functions in which angles are specified in degrees. The intrinsic functions ACOSPI, ASINPI, ATANPI, ATAN2PI, COSPI, SINPI, and TANPI are trigonometric functions in which angles are specified in halfrevolutions (that is, as multiples of π). The intrinsic function SELECTED_LOGICAL_KIND returns kind type parameter values for type logical. The intrinsic subroutine SPLIT parses a string into tokens, one at time. The intrinsic subroutine SYSTEM_CLOCK supports more than one system clock for an image. The intrinsic subroutine TOKENIZE parses a string into tokens. When a deferred-length allocatable actual argument of an intrinsic procedure is to be assigned character data, it is allocated by the processor to the length of the data. Execution of a collective subroutine can be successful on an image even when an error condition occurs for the corresponding execution on another image.

- Intrinsic modules:

Additional named constants LOGICAL8, LOGICAL16, LOGICAL32, LOGICAL64, and REAL16 have been added to the intrinsic module ISO_FORTRAN_ENV. The subroutines IEEE_GET_ROUNDING_MODE, IEEE_GET_UNDERFLOW_MODE, IEEE_SET_ROUNDING_MODE, and IEEE_SET_UNDERFLOW_MODE from the intrinsic module IEEE_ARITHMETIC, are now considered to be pure and simple. The subroutines IEEE_GET_MODES, IEEE_GET_STATUS, IEEE_SET_MODES, and IEEE_SET_STATUS from the intrinsic module IEEE_EXCEPTIONS, are now considered to be pure and simple. The procedures C_F_STRPTR and F_C_STRING have been added to the intrinsic module ISO_C_BINDING to assist in the use of null-terminated strings. The subroutine C_F_POINTER in the intrinsic module ISO_C_BINDING has an extra optional dummy argument, LOWER, that specifies the lower bounds for FPTR.

- Changes to the intrinsic module IEEE_ARITHMETIC for conformance with ISO/IEC 60559:2020: The new functions IEEE_MAX, IEEE_MAX_MAG, IEEE_MIN, and IEEE_MIN_MAG perform the the operations maximum, maximumMagnitude, minimum, and minimum Magnitude in ISO/IEC 60559:2020. The functions IEEE_MAX_NUM, IEEE_MAX_NUM_MAG, IEEE_MIN_NUM, and IEEE_MIN_NUM_MAG now conform to the operations maximumNumber, maximumMagnitudeNumber, minimum- Number and minimum MagnitudeNumber in ISO/IEC 60559:2020; the changes affect the treatment of zeroes and NaNs.

- Program units and procedures:

A procedure can be specified to be a simple procedure; a simple procedure references or defines nonlocal variables only via its dummy arguments. Conditional arguments provide actual argument selection in a procedure reference.

The text of ISO/IEC Standard *may be* approved as suitable for publication as an Indian Standard without deviations. Certain conventions are however not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words ‘International Standard’ appears referring to this standard, they should be read as ‘Indian Standard’.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current Practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their places, are listed below along with their degree of equivalence for editions indicated. For undated references, the latest edition of the referenced document applies, including any corrigenda and amendment:

International Standard	Corresponding Indian Standard	Degree of Equivalence
ISO/IEC 60646 : 1991 7 Bit coded character set for information interchange (First Revision)	IS 10315 : 1997 7 Bit coded character set for information interchange (First Revision)	Identical with (ISO/IEC 60646 : 1991)

ISO/IEC 9899:2011 Information Technology — Programming Languages — C	IS/ISO/IEC 9899 : 2018 Information Technology — Programming Languages — C	Identical with (ISO/IEC 9899 : 2018)
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The technical committee has reviewed the provisions of following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard. For undated references, the latest edition of the referenced document applies, including any corrigenda and amendment

International Standards	Title
ISO/IEC 10646	Information technology—Universal Multiple-Octet Coded Character Set (UCS)
ISO/IEC/IEEE 60559:2011	Information technology — Microprocessor Systems — Floating-Point arithmetic

Scope of ISO/IEC DIS 1539-1 is as follows:

1. This document specifies the form and establishes the interpretation of programs expressed in the base Fortran language. The purpose of this document is to promote portability, reliability, maintainability, and efficient execution of Fortran programs for use on a variety of computing systems.
2. This document specifies
 - the forms that a program written in the Fortran language may take,
 - the rules for interpreting the meaning of a program and its data,
 - the form of the input data to be processed by such a program, and
 - the form of the output data resulting from the use of such a program.

3. Except where stated otherwise, requirements and prohibitions specified by this document apply to programs rather than processors.
4. This document does not specify
 - the mechanism by which programs are transformed for use on computing systems,
 - the operations required for setup and control of the use of programs on computing systems,
 - the method of transcription of programs or their input or output data to or from a storage medium,
 - the program and processor behavior when this document fails to establish an interpretation except for the processor detection and reporting requirements in items (2) to (10) of 4.2,
 - the maximum number of images, or the size or complexity of a program and its data that will exceed the capacity of any particular computing system or the capability of a particular processor,
 - the mechanism for determining the number of images of a program,
 - the physical properties of an image or the relationship between images and the computational elements of a computing system,
 - the physical properties of the representation of quantities and the method of rounding, approximating, or computing numeric values on a particular processor, except by reference to ISO/IEC/IEEE 60559:2011 under conditions specified in Clause 17,
 - the physical properties of input/output records, files, and units, or
 - the physical properties and implementation of storage.

Note: - The Technical content of this document has not been enclosed as these are identical with the corresponding ISO/IEC Standard. For details please refer to ISO/IEC DIS 1539-1 or kindly contact.

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