Draft for Working Group Ballot of PNWI

Information Technology — Programming Languages — Ada: Conformity Assessment of a Language Processor

Technologies de l'information — Langages de programmation — Ada: Evaluation de la conformité d'un processeur de langage
Draft 6, Revised -- EP -- 981120

(This is a revision of draft 5, in which I reflected comments made by WG9 and by various people over the net. They are fairly minimal vis-a-vis draft 5. Added provisions: unique ids for tests, uniform set of processor options during testing; expiration policy for certificates; no more multi-lateral agreements among ACALs, instead automatic recognition; construction process out of scope; auditing provisions for ACAA over ACALs; no more accreditation or designation of ACALs by standards bodies (problem in the US); some left-overs from past ACAP model fixed. More or less editorials: consistently British spelling; added standard-specific glossary; a general section; did all the bolding of terms and some unbolding; }

Draft 5, Revised -- EP -- 981025

(This is a revision of draft 4, in which I reflected comments made by the ARG, comments made by various people over the net, and last not least, my own opinion. The changes are textually more massive than I originally intended, although intents have been maintained, albeit refined. The ISO template for producing this file have a serious bug -- they work only with the English version of Word. Hence the subclause numbering is by hand !. Nor could I adjust the cover page.

I have not yet revised sections 1 through 5.)

Draft 4, Revised -- JWM -- 980902

{Note to reviewers: This is an early draft. In preparing the draft, I have followed a few typographical conventions. First, temporary notes that will be removed after drafting are enclosed in curly brackets, like this paragraph. Many of the provisions of this draft are copied from ISO/IEC guides; the sources of those provisions are enclosed in [square brackets]. Other provisions also have their source identified, e.g. [PB] for Phil Brashear. I have been very careful with terminology. Most of the terminology has been gathered from relevant ISO/IEC documents. Uses of the terms have been highlighted in bold face. Please try to use this terminology. [JM]}

{List of Changes:

WD 99999 contains:

— 7/18: Changed ACAF to ACAL to better align with the terminology of ISO25.
— 7/18: Added definition of test certificate and document to better relate with ISO25.
— 7/18: I converted some of the goals to specific provisions.
— 7/18: I numbered the untitled subclauses for easier reference.

WD 99999.2 contains:

— 7/28: Added suggestions from [PB] as subclause 7.2.
— 7/28: Made some formatting improvements.

WD 99999.3 contains:

— 7/31: Removed some unneeded definitions and notes; made formatting improvements and minor editorial changes; added subclause 6.2.1; made a minor change to the title; and tried my best to provide a French title.
— This version was published as WG9 N 348.
WD 99999.4 contains:

— I added a number of provisions proposed by Phil Brashear and Michael Tonndorf.

— I removed some material that stated goals for each section of the document. These were intended only as notes to ourselves. I removed them whenever it seemed that the draft was now adequate to accomplish the goals.

— I removed Clause 5, which stated some goals for the entire document. An empty clause 5 remains so that we may continue to use the same section numbering. The empty clause 5 may be removed and the sections renumbered whenever convenient.

— I stopped using boldfacing to call attention to terms defined in this standard. That practice was intended to acquaint us with the vocabulary. I think it has served its purpose and is now more trouble than it is worth. When we’re finished with the standard, we can think about whether we want to go back and provide accurate bolding.

— This version was turned over to the ARG for its continued work.)
Information Technology — Programming Languages — Ada: Conformity Assessment of a Language Processor

Technologies de l'information — Langages de programmation — Ada: Evaluation de la conformité d'un processeur de langage
Contents

1 Scope ................................................................................................................................. 1
2 Conformity .......................................................................................................................... 1
3 Normative reference(s) ...................................................................................................... 2
4 Term(s) and definition(s) .................................................................................................... 2
  4.1 Standardisation ............................................................................................................. 2
  4.2 Aims of standardisation ............................................................................................... 2
  4.3 Normative documents ................................................................................................. 2
  4.4 Bodies responsible for standards and regulations ......................................................... 3
  4.5 Type of standards ......................................................................................................... 3
  4.6 Content of normative documents ................................................................................ 3
  4.7 Conformity assessment in general ............................................................................... 4
  4.8 Determination of characteristics ............................................................................... 6
  4.9 Conformity evaluation ............................................................................................... 6
  4.10 Assurance of conformity ........................................................................................... 6
  4.11 Approval and recognition arrangements .................................................................. 7
  4.12 Accreditation of conformity assessment bodies and persons .................................... 8
  4.13 Programming language processor test methods ....................................................... 8
  4.14 Miscellaneous ......................................................................................................... 9
  4.15 Terms and definitions of this standard .................................................................... 9
5 General ............................................................................................................................... 10
6 Ada Conformity Assessment Laboratory (ACAL) ............................................................. 10
  6.1 General ....................................................................................................................... 10
    6.1.1 Organization and management ........................................................................... 10
    6.1.2 Quality system and review ................................................................................. 11
    6.1.3 Personnel .......................................................................................................... 11
    6.1.4 Handling of test items ....................................................................................... 12
    6.1.5 Records ............................................................................................................. 12
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1.6</td>
<td>Certificates and reports</td>
<td>12</td>
</tr>
<tr>
<td>6.1.7</td>
<td>Sub-contracting of testing</td>
<td>13</td>
</tr>
<tr>
<td>6.1.8</td>
<td>Outside support services and supplies</td>
<td>14</td>
</tr>
<tr>
<td>6.1.9</td>
<td>Complaints</td>
<td>14</td>
</tr>
<tr>
<td>6.2</td>
<td>Specific Requirements for Ada Conformity Assessment Laboratories (ACAL)</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>Ada Conformity Assessment Authority (ACAA)</td>
<td>15</td>
</tr>
<tr>
<td>7.1</td>
<td>General requirements</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Ada Conformity Assessment Process</td>
<td>15</td>
</tr>
<tr>
<td>8.1</td>
<td>General requirements</td>
<td>16</td>
</tr>
<tr>
<td>8.2</td>
<td>Conduct of the testing</td>
<td>16</td>
</tr>
<tr>
<td>8.2.1</td>
<td>General requirements</td>
<td>16</td>
</tr>
<tr>
<td>8.2.2</td>
<td>Obtaining a customised test suite and self-testing</td>
<td>17</td>
</tr>
<tr>
<td>8.2.3</td>
<td>Evaluation of self-test results</td>
<td>17</td>
</tr>
<tr>
<td>8.2.4</td>
<td>Witness testing</td>
<td>17</td>
</tr>
<tr>
<td>8.2.5</td>
<td>Documentation of test results</td>
<td>18</td>
</tr>
<tr>
<td>8.2.6</td>
<td>Issuing the Certificate of Conformity</td>
<td>18</td>
</tr>
<tr>
<td>8.2.7</td>
<td>Certification of closely related processors</td>
<td>18</td>
</tr>
<tr>
<td>8.3</td>
<td>Test issue management</td>
<td>19</td>
</tr>
<tr>
<td>8.4</td>
<td>Marks of conformity</td>
<td>20</td>
</tr>
<tr>
<td>9</td>
<td>Ada Conformity Assessment Procedure (ACAP)</td>
<td>20</td>
</tr>
<tr>
<td>9.1</td>
<td>General requirements</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>Ada Conformity Assessment Test Suite (ACATS)</td>
<td>20</td>
</tr>
<tr>
<td>10.1</td>
<td>General requirements</td>
<td>20</td>
</tr>
<tr>
<td>10.2</td>
<td>Design of test suite</td>
<td>21</td>
</tr>
<tr>
<td>10.3</td>
<td>Maintenance and revision of the test suite</td>
<td>22</td>
</tr>
<tr>
<td>10.4</td>
<td>Availability of the test suite</td>
<td>22</td>
</tr>
<tr>
<td>Annex</td>
<td>(informative) Bibliography</td>
<td>23</td>
</tr>
</tbody>
</table>
Foreword

ISO (the International Organization for Standardisation) and IEC (the International Electrotechnical Commission) form the specialised system for worldwide standardisation. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

This standard was prepared by Working Group 9 (Ada) of Subcommittee 22 (Programming Languages, their Environments and System Software Interfaces) of Joint Technical Committee 1 (Information Technology). The standard establishes requirements for assessing the conformity of Ada language processors to the provisions of the Ada language standard.

Portions of the standard are based upon U.S. Department of Defense procedures for Ada compiler “validation.” The co-operation of the U.S. DoD in contributing the appropriate documents is gratefully acknowledged.

ISO, IEC, JTC1 and SC22 have already prepared a number of documents related to conformity assessment. Rather than make normative references to these documents, this standard incorporates appropriate excerpts of their text, in some cases paraphrasing the text, changing the normative strength, or adapting the provision to the specific circumstances. In each case, the original source of the provision is noted in brackets. Therefore, these documents are listed in Annex A, an informative bibliography, rather than in Clause 3, Normative References.

In order to better relate to the large body of existing work, particular attention has been paid to terminology. Throughout this international standard, terms defined either explicitly or by provision of the standard have been presented in bold typeface.
Introduction

The Ada language community has a strong tradition of “compiler validation,” meaning conformity assessment. Originally, the validation program was administered under the auspices of the United States Department of Defense, as the use of “validated” compilers was a condition of usage in defence programmes. Three key elements of this validation program were the conduct of testing by independent testing laboratories, resolution of any test issues by a single authority (the “Ada Validation Organization”), and world-wide acceptance of the “validation certificates” resulting from successful conformity testing. In 1998, the U.S. DoD elected to turn the responsibility for conformity assessment over to the private sector. This international standard provides the basis for private sector conformity assessment. It is the intent of this international standard to ratify existing practices for Ada conformity assessment.

In general terms, this international standard states that independent Ada Conformity Assessment Laboratories (ACAL) would perform the conformity assessment. The various ACALs would collaborate on the formation or designation of a single Ada Conformity Assessment Authority (ACAA). The ACAA would manage and administer an Ada Conformity Assessment Test Suite (ACATS). Each ACAL would perform conformity assessments by applying the ACATS in accordance with an Ada Conformity Assessment Procedure (ACAP). Each ACAL would issue certificates of conformity known as Ada Conformity Assessment Certificates (ACAC).

The ACAA would act in the role of the current de facto “Ada Validation Organization” and its “Fast Reaction Team” and would also participate in the work of ISO/IEC JTC1/SC22/WG9 in order to apprise that group of possible defects discovered in the language as a result of compiler conformity testing.

This international standard does not reuse an existing test method designed for any other language [as suggested by ISO/IEC Guide 2, 6.7.1] but instead describes a method that, although new to standardisation, has a long de facto tradition within the Ada community. This method is based upon a well established method that has already been in uniformly applied usage for 15 years. Continuity with this tradition is considered essential to the success of the current language standard.

This standard has the following goals:

— The standard should permit a smooth transition from the current de facto method of “Ada compiler validation” to the standardised method.

— Users of Ada processor certifications should gain the same degree of assurance as is gained with the current de facto certification mechanism.
Information Technology — Programming Languages — Ada: Conformity Assessment of a Language Processor

1 Scope

1.1 This international standard establishes requirements for certifying an assessment that an Ada language processor conforms to the requirements of the Ada Language Standard, ISO/IEC 8652. It places requirements on the organization that performs the assessment, the assessment procedures, and the test suite used in the assessment. Finally, it places requirements on the form for the certificate of conformity.

1.2 This international standard concerns only the assessment of conformity to the language provisions of ISO/IEC 8652. It does not concern the assessment of any other characteristics of a language processor or of the construction process used by the manufacturer of the language processor.

NOTE In the sense of [ISO/IEC Guide 23], the Ada Language Standard, ISO/IEC 8652, is to be regarded as a standard for a specific property rather than a comprehensive product standard.

1.3 This international standard is intended to be primarily suitable by a third party authority although portions of it may also be applied by a supplier (first party) or by a user or purchaser (second party).

1.4 An Ada language processor may be claimed to conform to the provisions of ISO/IEC 8652 regardless of the application of the current international standard. This international standard prescribes the method for obtaining a certification that a language processor conforms. Customers desiring to acquire a language processor certified in accordance with this international standard should explicitly require that certification by citing this international standard.

1.5 Certification should not be construed as guaranteeing that the certified product is free of non-conformities or defects; it only certifies that no evidence of non-conformity was found during the certification process.

2 Conformity

2.1 An Ada language processor is said to be certified as conforming if so assessed by the Ada Conformity Assessment Authority (ACAA). In providing this certification, the ACAA shall consider the results of testing performed by an Ada Conformity Assessment Laboratory (ACAL). The ACAL testing shall be performed in accordance with the Ada Conformity Assessment Procedure (ACAP) using the Ada Conformity Assessment Test Suite (ACATS).

2.2 This international standard places requirements upon the ACAL, ACAA, ACAP and ACATS.

NOTE 1 Conformity of an “implementation” of the Ada standard is defined by Clause 1.1.3 of ISO/IEC 8652. The term “language processor” or “compiler” in this international standard is to be regarded as synonymous with the term “implementation” as used in ISO/IEC 8652. This international standard prescribes requirements for the assessment that a language processor conforms to the requirements of ISO/IEC 8652.

NOTE 2 An international standard on test methods, such as this one, does not imply any obligation to carry out any kind of test. It merely states the method by which the assessment, if required and referred to (for example, in the same or another standard, or in a regulation, or in contract documents), should be carried out. [ISO/IEC Directives, Part 2, Clause 6.5]
3 Normative reference(s)

The following normative documents contain provisions which, through reference in this text, constitute provisions of this international standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this international standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid international standards.

ISO/IEC 8652, Information technology — Programming languages — Ada

4 Term(s) and definition(s)

For the purposes of this international standard, the following terms and definitions apply.

4.1 Standardisation

consensus
general agreement, characterised by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments

NOTE Consensus need not imply unanimity.

[ISO/IEC Guide 2, 1.7]

4.2 Aims of standardisation

fitness for purpose
ability of a product, process or service to serve a defined purpose under specific conditions [ISO/IEC Guide 2, 2.1]

4.3 Normative documents

document
any medium with information recorded on or in it [ISO/IEC Guide 2, 3.1]

normative document
document that provides rules, guidelines or characteristics for activities or their results

NOTES

1 The term “normative document” is a generic term that covers such documents as standards, technical specifications, codes of practice and regulations.

2 The terms for different kinds of normative documents are defined considering the document and its content as a single entity.

[ISO/IEC Guide 2, 3.1]

standard
document, established by consensus and approved by a recognised body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context [ISO/IEC Guide 2, 3.2]

international standard
standard that is adopted by an international standardising/standards organization and made available to the public [ISO/IEC Guide 2, 3.2.1.1]
**technical specification**

document that prescribes technical **requirements** to be fulfilled by a product, process or service

NOTES

1. A technical specification would indicate, whenever appropriate, the procedure(s) by means of which it may be determined whether the requirements given are fulfilled.

2. A technical specification may be a **standard**, a part of a **standard** or independent of a **standard**.

[ISO/IEC Guide 2, 3.4]

**regulation**
document providing binding legislative rules, that is adopted by an **authority** [ISO/IEC Guide 2, 3.6]

**4.4 Bodies responsible for standards and regulations**

**body**
legal or administrative entity that has specific tasks and composition

NOTE Examples of bodies are organizations, authorities, companies and foundations.

[ISO/IEC Guide 2, 4.1]

**organization**
baby that is based on the membership of other bodies or individuals and has an established constitution and its own administration [ISO/IEC Guide 2, 4.2]

**international standardising organization**
standardising organization whose membership is open to the relevant national body from every country [ISO/IEC Guide 2, 4.3.2]

**authority**
baby that has legal powers and rights

NOTE An authority can be regional, national or local.

[ISO/IEC Guide 2, 4.5]

**4.5 Type of standards**

**testing standard**
standard that is concerned with test methods, sometimes supplemented with other provisions related to testing, such as sampling, use of statistical methods, sequence of tests [ISO/IEC Guide 2, 5.3]

**product standard**
standard that specifies requirements to be fulfilled by a product or a group of products, to establish its fitness for purpose [ISO/IEC Guide 2, 5.4]

**4.6 Content of normative documents**

**provision**
expression in the content of a normative document, that takes the form of a statement, an instruction, a recommendation or a requirement

NOTE These types of provision are distinguished by the form of wording they employ; e.g. instructions are expressed in the imperative mood, recommendations by the use of the auxiliary “should” and requirements by the use of the auxiliary “shall”.

[ISO/IEC Guide 2, 7.1]
statement
provision that conveys information [ISO/IEC Guide 2, 7.2]

instruction
provision that conveys an action to be performed [ISO/IEC Guide 2, 7.3]

recommendation
provision that conveys advice or guidance [ISO/IEC Guide 2, 7.4]

requirement
provision that conveys criteria to be fulfilled [ISO/IEC Guide 2, 7.5]

exclusive requirement
requirement of a normative document that must necessarily be fulfilled in order to comply with that document

NOTE The term “mandatory requirement” should be used to mean only a requirement made compulsory by law or regulation.

[ISO/IEC Guide 2, 7.5.1]

optional requirement
requirement of a normative document that must be fulfilled in order to comply with a particular option permitted by that document

NOTE An optional requirement may be either
(a) one of two or more alternative requirements; or
(b) an additional requirement that must be fulfilled only if applicable and that may otherwise be disregarded.

[ISO/IEC Guide 2, 7.5.2]

debetd-to-satisfv provision
provision that indicates one or more means of compliance with a requirement of a normative document

[ISO/IEC Guide 2, 7.6]

descriptive provision
provision for fitness for purpose that concerns the characteristics of a product, process or service

NOTE A descriptive provision usually conveys design, constructional details, etc. with dimensions and material composition.

[ISO/IEC Guide 2, 7.7]

4.7 Conformity assessment in general

conformity
fulfilment by a product, process or service of specified requirements [ISO/IEC Guide 2, 12.1]

conformity assessment
any activity concerned with determining directly or indirectly that relevant requirements are fulfilled

NOTE Typical examples of conformity assessment activities are sampling, testing and inspection; evaluation, verification and assurance of conformity (supplier’s declaration, certification); registration, accreditation and approval as well as their combinations.

[ISO/IEC Guide 2, 12.2; ISO/IEC Guide 7, 3.1]

conformity assessment body
body that conducts conformity assessment [ISO/IEC Guide 2, 12.3]
conformity assessment system
system that has its own rules of procedure and management for carrying out conformity assessment

NOTES
1 Conformity assessment systems may be operated at, for example, national, regional or international level.
2 Typical examples of conformity assessment systems are testing systems, inspection systems, or certification systems.

[ISO/IEC Guide 2, 12.4]

conformity assessment scheme
certification system as related to specified products, processes or services to which the same particular standards and rules, and the same procedure, apply

NOTE The term “programme” is used in some countries to cover the same concept as “scheme”.

[ISO/IEC Guide 2, 12.5]

access to a conformity assessment system
opportunity for an applicant to obtain conformity assessment under the rules of the system [ISO/IEC Guide 2, 12.6]

participant in a conformity assessment system
certification body that operates under the rules of the system without having the opportunity to take part in the management of the system [ISO/IEC Guide 2, 12.7]

member of a conformity assessment system
certification body that operates under the rules of the system and has the opportunity to take part in the management of the system [ISO/IEC Guide 2, 12.8]

third party
person or body that is recognised as being independent of the parties involved, as concerns the issue in question

NOTE Parties involved are usually supplier (“first party”) and purchaser (“second party”) interests.

[ISO/IEC Guide 2, 12.9]

registration
procedure by which a body indicates relevant characteristics of a product, process or service, or particulars of a body or person, in an appropriate, publicly available list [ISO/IEC Guide 2, 12.10]

accreditation
procedure by which an authoritative body gives formal recognition that a body or person is competent to carry out specific tasks [ISO/IEC Guide 2, 12.11]

reciprocity
bilateral relationship where both parties have the same rights and obligations towards each other [ISO/IEC Guide 2, 12.12]

equal treatment
treatment accorded to products, processes or services originating in other countries that is no less favourable than that accorded to like products, processes or services of national origin, in a comparable situation [ISO/IEC Guide 2, 12.13]
4.8 Determination of characteristics

test
technical operation that consists of the determination of one or more characteristics of a given product, process or service according to a specified procedure [ISO/IEC Guide 2, 13.1]

testing
action of carrying out one or more tests [ISO/IEC Guide 2, 13.1.1]

test method
specified technical procedure for performing a test [ISO/IEC Guide 2, 13.2]

test report
document that presents test results and other information relevant to a test [ISO/IEC Guide 2, 13.3]

test certificate
a test report issued under the procedures of a third party certification system

laboratory
body that calibrates and/or tests [ISO/IEC Guide 25, 3.1]

testing laboratory
laboratory that performs tests

NOTE The term “testing laboratory” can be used in the sense of a legal entity, a technical entity or both. [ISO/IEC Guide 2, 13.4]

4.9 Conformity evaluation

conformity evaluation
systematic examination of the extent to which a product, process or service fulfils specified requirements [ISO/IEC Guide 2, 14.1]

inspection
conformity evaluation by observation and judgement accompanied as appropriate by measurement, testing or gauging [ISO/IEC Guide 2, 14.2]

inspection body
body that performs inspection [ISO/IEC Guide 2, 14.3]

verification
confirmation by examination and provision of evidence that specified requirements have been met [ISO/IEC Guide 25, 3.8]

conformity testing
conformity evaluation by means of testing [ISO/IEC Guide 2, 14.4]

type testing
conformity testing on the basis of one or more specimens of a product representative of the production [ISO/IEC Guide 2, 14.5]

4.10 Assurance of conformity

assurance of conformity
activity resulting in a statement giving confidence that a product, process or service fulfils specified requirements

NOTE For a product, the statement may be in the form of a document, a label or other equivalent means. It may also be printed in or applied on a communication, a catalogue, an invoice, a user instructions manual, etc. relating to the product.
supplier’s declaration
procedure by which a supplier gives written assurance that a product, process or service conforms to specified requirements

NOTE In order to avoid any confusion, the expression “self-certification” should not be used.

 certification
procedure by which a third party gives written assurance that a product, process or service conforms to specified requirements

certification body
body that conducts certification

NOTE A certification body may operate its own testing and inspection activities or oversee these activities carried out on its behalf by other bodies.

certificate of conformity
a document issued under the procedures of a third party certification system and attesting that a product or service is in conformity with specific standards or other technical specifications

mark of conformity
a legally registered certification mark applied by or issued under the procedures of a third party certification system for a product or service which is in conformity with specific standards or other technical specifications

4.11 Approval and recognition arrangements

approval
permission for a product, process or service to be marketed or used for stated purposes or under stated conditions

type approval
approval based on type testing

recognition arrangement
agreement that is based on the acceptance by one party of results, presented by another party, from the implementation of one or more designated functional elements of a conformity assessment system

NOTES

1 Typical examples of recognition arrangements are testing arrangements, inspection arrangements and certification arrangements.

2 Recognition arrangements may be established at national, regional or international level.

3 An agreement limited to declaration of equivalence of procedures without acceptance of results does not meet the above definition.

multilateral arrangement
recognition arrangement that covers the acceptance of each other’s results by more than two parties
4.12 Accreditation of conformity assessment bodies and persons

accreditation system
system that has its own rules of procedure and management for carrying out accreditation

NOTE Accreditation of conformity assessment bodies is normally awarded following successful assessment and is followed by appropriate surveillance.

[ISO/IEC Guide 2, 17.1]

accreditation body
body that conducts and administers an accreditation system and grants accreditation [ISO/IEC Guide 2, 17.2]

accredited body
body to which accreditation has been granted [ISO/IEC Guide 2, 17.3]

accreditation criteria
set of requirements that is used by an accreditation body, to be fulfilled by a conformity assessment body in order to be accredited [ISO/IEC Guide 2, 17.4]

4.13 Programming language processor test methods

configuration
host and target computers, any operating system(s) and software used to operate a processor [ISO TR 9547, 2.1]

extension
a facility in the implemented language that is not given in the language standard but that does not cause any ambiguity or contradiction when added to the language standard (although, in some languages, it may serve to lift a restriction) [ISO TR 9547, 2.2]

implementation defined
dependent on the processor but required by the language standard to be defined and documented by the implementer [ISO TR 9547, 2.3]

processor
a compiler, translator or interpreter working in combination with a configuration [ISO TR 9547, 2.4]

test program
a sequence of characters intended to be submitted to a processor in order to determine whether or not this processor exhibits a specific instance of a certain property [ISO TR 9547, 2.7]

test suite
a reference set of test programs that is designed to assess conformity of a processor with a language standard [ISO TR 9547, 2.9]

test tools
any additional means that can improve the efficiency, the reliability and the ease of use of the different phases of testing (e.g. implementation of the test suite, ensuring integrity, processing of the test suite, collecting test results, analysis of test results, producing a test report) [ISO TR 9547, 2.10]

required documents
the set of documents required by the programming language standard [ISO TR 9547, 2.11]

subset
a subset S of a programming language L is a programming language such that every program in S

— is also a program in L and
— has the same meaning in S as it has in L
[ISO TR 9547, 2.12]

4.14 Miscellaneous

quality manual
a document stating the quality policy, quality system and quality practices of an organization.

NOTE The quality manual may call up other documentation relating to the organization’s quality arrangements.

NOTE The quality manual may be a distinct part of other documentation.

[ISO/IEC Guide 25, 3.10]

Core Language
the provisions of clauses 1-13 and Annexes A, B, and J of ISO/IEC 8652

NOTE Conformity to the Core Language is required by any Ada language processor

[ISO/IEC 8652]

Specialised Needs Annexes
Annexes C through H of ISO/IEC 8652

NOTE An Ada language processor may conform to some or none of these Annexes

[ISO/IEC 8652]

4.15 Terms and definitions of this standard

Ada Conformity Assessment Process
the process by which conformity of Ada language processors to the language standard ISO/IEC 8652 is assessed

Ada Conformity Assessment Procedure (ACAP)
detailed provisions, instructions, requirements and descriptions of processes regarding all aspects of the Ada Conformity Assessment Process collected in a document

Ada Conformity Assessment Laboratory (ACAL)
an independent testing laboratory conducting conformity assessment tests in accordance with this international standard

Ada Conformity Assessment Authority (ACAA)
an organization that ensures word-wide commonality of the Ada Conformity Assessment Process

Ada Conformity Assessment Test Suite (ACATS)
the test suite used in the Ada Conformity Assessment Process

certification by derivation
registration of conforming processors obtained by adaptive and perfective maintenance from a processor for which conformity of the processor was successfully assessed by witness-testing on the same or a closely related configuration

certification by extension
registration of a conforming processor on configurations closely related to the configuration on which conformity of the processor was successfully assessed by witness-testing

client
an organization that obtains conformity assessment services from an ACAL
manufacturer
an organization responsible for the production and maintenance of a language processor

self-testing
the processing of an appropriately customised version of the ACATS, but not under the observation of an ACAL

test issue
any disagreement between an ACAL and its client over the conduct of the conformity assessment and, in particular, any disagreement over the fitness for purpose of any test in the ACATS

witness testing
the processing of an appropriately customised version of the ACATS under the observation of an ACAL

5 General

The provisions of this international standard create a framework in which conformity assessment of Ada language processors to the Ada language standard, ISO/IEC 8652, can be conducted world-wide, while ensuring complete uniformity in test methods, assessment criteria, and test issue resolution, thus facilitating international recognition arrangements of test reports and certificates of conformity.

6 Ada Conformity Assessment Laboratory (ACAL)

6.1 General requirements

In accordance with the provisions of [ISO/IEC Guide 25, 1.1], this subclause sets out the general requirements in accordance with which a laboratory has to demonstrate that it operates, if it is to be recognised as competent to carry out specific tests. In this subclause the provisions of [ISO/IEC Guide 25] have been tailored to Ada Conformity Assessment Laboratories (ACAL). Additional provisions specific to Ada Conformity Assessment are given in subclause 6.2.

6.1.1 Organization and management

6.1.1.1 The laboratory shall be legally identifiable. It shall be organised and shall operate in such a way that its permanent, temporary and mobile facilities meet the requirements of this international standard. [ISO/IEC Guide 25, 4.1]

6.1.1.2 The laboratory shall

a) have a managerial staff with the authority and resources needed to discharge their duties;

b) have arrangements to ensure that its personnel are free from any commercial, financial and other pressures which might adversely affect the quality of their work;

c) be organised in such a way that confidence in its independence of judgement and integrity is maintained at all times;

d) have a technical manager (however named) who has overall responsibility for the technical operations;

e) have a quality manager (however named) who has responsibility for the quality system and its implementation. The quality manager shall have direct access to the highest level of management at which decisions are taken on laboratory policy or resources, and to the technical manager. In some laboratories, the quality manager may also be the technical manager or deputy technical manager;

f) where appropriate, participate in interlaboratory comparisons and proficiency testing programmes.

[ISO/IEC Guide 25, 4.2]
6.1.2 Quality system and review

6.1.2.1 The laboratory shall establish and maintain a quality system appropriate for the needs of conformity testing of Ada language processors. The elements of this system shall be documented. The quality documentation shall be available for use by the laboratory personnel. The laboratory shall define and document its policies and objectives for, and its commitment to, good laboratory practice and quality of testing services. The laboratory management shall ensure that these policies and objectives are documented in a quality manual and communicated to, understood, and implemented by all laboratory personnel concerned. The quality manual shall be maintained current under the responsibility of the quality manager. [ISO/IEC Guide 25, 5.1]

6.1.2.2 The quality manual, and related quality documentation, shall state the laboratory’s policies and operational procedures established in order to meet the requirements of this international standard. The quality manual and related quality documentation shall also contain:

a) a quality policy statement, including objectives and commitments, by top management;
b) the organization and management structure of the laboratory, its place in any parent organization and relevant organisational charts;
c) the relations between management, technical operations, support services and the quality system;
d) procedures for controlled maintenance of documentation;
e) job descriptions of key staff and reference to the job descriptions of other staff;
f) identification of the laboratory’s approved signatories (where this concept is appropriate);
g) the laboratory’s scope of tests;
h) reference to the test procedures used;
i) procedures to be followed for feedback and corrective action whenever testing discrepancies are detected, or departures from documented policies and procedures occur;
j) procedures for dealing with complaints;
k) procedures for protecting confidentiality and propriety rights;
l) procedures for audit and review.

NOTE “Top management” refers to the highest level of management of the laboratory.

[ISO/IEC Guide 25, 5.2]

6.1.2.3 The quality system adopted to satisfy the requirements of this international standard shall be reviewed at least once a year by the management to ensure its continuing suitability and effectiveness and to introducing necessary changes or improvements. [ISO/IEC Guide 25, 5.4]

6.1.2.4 All review findings and any corrective actions that arise from them shall be documented. The person responsible for quality shall ensure that these actions are discharged within the agreed timescale. [ISO/IEC Guide 25, 5.5]

6.1.3 Personnel

6.1.3.1 The laboratory shall have sufficient personnel, having the necessary education, training, technical knowledge and experience for their assigned functions. [ISO/IEC Guide 25, 6.1]

6.1.3.2 The laboratory shall ensure that the training of its personnel is kept up-to-date. [ISO/IEC Guide 25, 6.2]
6.1.3.3 Records on the relevant qualifications, training, skills and experience of the technical personnel shall be maintained by the laboratory. [ISO/IEC Guide 25, 6.3]

6.1.4 Handling of test items

6.1.4.1 The laboratory shall have a documented system for uniquely identifying the Ada language processors to be tested, to ensure that there can be no confusion regarding the identity of such processors at any time. [ISO/IEC Guide 25, 11.1]

6.1.5 Records

6.1.5.1 The laboratory shall maintain a record system to suit its particular circumstances and comply with any applicable regulations. It shall retain on record all original observations, calculations and derived data, test report and certificate of conformity for an appropriate period. The records for each test shall contain sufficient information to permit its repetition. The records shall include the identity of personnel involved in testing. [ISO/IEC Guide 25, 12.1]

6.1.5.2 All records, certificates and reports shall be safely stored, held secure and in confidence to the client, unless specified otherwise by this international standard. [ISO/IEC Guide 25, 12.2]

6.1.6 Certificates and reports

6.1.6.1 The results of each conformity testing carried out by the laboratory shall be reported accurately, clearly, unambiguously and objectively, in accordance with the instructions of the Ada Conformity Assessment Procedure (ACAP, see clause 9). The results shall be reported in a test report and should include all the information necessary for the interpretation of the test results and all information required by the method used. [ISO/IEC Guide 25, 13.1]

6.1.6.2 Each test report shall include at least the following information:

a) a title, e.g. “Test report”;

b) name and address of laboratory, and location where the testing was carried out;

c) unique identification of the test report (such as serial number) and of each page, and the total number of pages;

d) name and address of client, where appropriate;

e) unambiguous identification of the Ada language processor tested;

f) name and address of the manufacturer of the Ada language processor (if different from client);

g) configuration in which the Ada language processor was tested;

h) option settings under which the Ada language processor was tested;

i) date of test;

j) unambiguous identification of the test suite (ACATS) version used in testing;

k) identification of the Specialised Needs Annexes to which conformity was tested;

l) any deviations from, additions to or exclusions from the test method, and any other information relevant to a specific test, such as test parameterization;

m) any failures identified;

n) any additional information as specified by the ACAP;
o) signature and title, or an equivalent identification of the person(s) accepting responsibility for the content of the test report and date of issue.

[ISO/IEC Guide 25, 13.2]

6.1.6.3 Upon successful conformity testing, the test results should be summarised in a certificate of conformity, in accordance with the instructions in the ACAP. See also subclause 8.2.6.

6.1.6.4 Each certificate of conformity shall include at least the following information:

a) a title, e.g. “Certificate of conformity”;

b) unique identification of the certificate of conformity (such as a serial number);

c) unambiguous identification of the Ada language processor tested;

d) name and address of the manufacturer of the Ada language processor;

e) configuration in which the Ada language processor was tested;

f) unambiguous identification of the test suite (ACATS) version used in testing;

g) reference to the appropriate standards;

h) name and address of the issuing laboratory;

i) identification of any Specialised Needs Annexes to which conformity was tested;

j) other summary information as specified by the ACAP;

k) signature and title, or an equivalent identification of the person(s) accepting responsibility for the content of the certificate and date of issue.

[ISO/IEC Guide 23, 7.2]

6.1.6.5 Particular care and attention shall be paid to the arrangement of the certificate of conformity and of the test report, especially with regard to presentation of the test data and ease of assimilation by the reader. There shall be a standard format of the certificate and of the test report for all Ada conformity tests. [ISO/IEC Guide 25, 13.4]

6.1.6.6 Material amendments to a test report or certificate of conformity after issue shall be made only in the form of a further document, or data transfer including the statement “Supplement to Test Report or Test Certificate, serial number… [or as otherwise identified]”, or equivalent form of wording. Such amendments shall meet all the relevant requirements of sub-clause 6.1.5 of this Guide. [ISO/IEC Guide 25, 13.5]

6.1.6.7 The laboratory shall ensure that, where clients require transmission of test results by telephone, telex, facsimile or other electronic or electromagnetic means, staff follows documented procedures that ensure that the requirements of this international standard are met and that confidentiality is preserved. [ISO/IEC Guide 25, 13.7]

6.1.7 Sub-contracting of testing

6.1.7.1 Where a laboratory sub-contracts any part of the testing, this work shall be placed with a laboratory complying with these requirements. The laboratory shall ensure and be able to demonstrate that its sub-contractor is competent to perform the activities in question and complies with the same criteria of competence as the laboratory in respect of the work being sub-contracted. The laboratory shall advise the client in writing of its intention to sub-contract any portion of the testing to another party. [ISO/IEC Guide 25, 14.1]
6.1.7.2 The laboratory shall record and retain details of its investigation of the competence and compliance of its sub-contractors and maintain a register of all sub-contracting. [ISO/IEC Guide 25, 14.2]

6.1.8 Outside support services and supplies

6.1.8.1 Where the laboratory procures outside services and supplies, other than those referred to in this international standard, in support of test, the laboratory shall use only those outside support services and supplies that are of adequate quality to sustain confidence in the laboratory’s tests. [ISO/IEC Guide 25, 15.1]

6.1.8.2 Where no independent assurance of the quality of outside support services or supplies is available, the laboratory shall have procedures to ensure that purchased equipment, materials and services comply with specified requirements. The laboratory should, whenever possible, ensure that purchased equipment and consumable materials are not used until they have been inspected or otherwise verified as complying with any standard specifications relevant to the tests concerned. [ISO/IEC Guide 25, 15.2]

6.1.8.3 The laboratory shall maintain records of all suppliers from whom it obtains support services or supplies required for tests. [ISO/IEC Guide 25, 15.3]

6.1.9 Complaints

6.1.9.1 The laboratory shall have documented policy and procedures for the resolution of complaints received from clients or other parties about the laboratory’s activities. A record shall be maintained of all complaints and of the actions taken by the laboratory. [ISO/IEC Guide 25, 16.1]

6.1.9.2 Where a complaint, or any other circumstance, raises doubt concerning the laboratory’s compliance with the laboratory’s policies or procedures, or with the requirements of this international standard or otherwise concerning the quality of the laboratory’s tests, the laboratory shall ensure that those areas of activity and responsibility involved are promptly reviewed. [ISO/IEC Guide 25, 16.2]

6.1.9.3 In addition, the laboratory shall comply with the specific requirements set forth by this international standard on complaints relating to the test method.

6.2 Specific Requirements for Ada Conformity Assessment Laboratories (ACAL)

6.2.1 Each ACAL shall enter into a bilateral arrangement with the ACAA (see clause 7) and abide by the procedures maintained and rulings issued by the ACAA. The ACAA shall have the right to audit conformity of each ACAL to the procedures and rulings issued by the ACAA.

6.2.2 Each ACAL shall recognise and accept certificates of conformity, test reports and testing results produced by other ACALs in accordance with this international standard.

6.2.3 Each ACAL shall comply with the Ada Conformity Assessment Process set forth by this international standard and with the Ada Conformity Assessment Procedure (ACAP) formulated co-operatively by the ACAA and the ACALs.

6.2.4 Each ACAL shall be able to prove its conformance with the requirements imposed on testing laboratories by this international standard.

6.2.5 An ACAL or any of its sub-contractors shall not have organisational ties to a manufacturer, supplier, or vendor of an Ada language processor.

6.2.6 Each ACAL shall offer all services specified in subclause 8.2.
7 Ada Conformity Assessment Authority (ACAA)

7.1 General requirements

7.1.1 A single Ada Conformity Assessment Authority (ACAA) shall be designated by agreement of the various ACALs.

7.1.2 The ACAA shall be operated by a sponsor. An organization that produces Ada language processors for commercial gain shall not be the sponsor, but an association of such organizations may be the sponsor if it establishes procedures for operating the ACAA in a manner that does not favour suppliers of Ada language processors, either individually or as a group.

7.1.3 The ACAA shall establish procedures for its governance and shall execute those procedures.

7.1.4 The ACAA shall establish procedures for the designation, management and maintenance of the Ada Conformity Assessment Test Suite (ACATS, see clauses 8 and 10) and shall ensure that those procedures are appropriately executed.

7.1.5 The ACAA shall manage the evolution of the ACATS in response to technical issues arising from its use.

7.1.6 The ACAA shall manage the evolution of the ACATS in response to revisions of the Ada language standard ISO/IEC 8652.

7.1.7 The ACAA shall review the test reports produced by any ACAL in the execution of the Ada Conformity Assessment Process and shall authorise each certificate of conformity.

7.1.8 The ACAA shall ensure the public availability of test reports and certificates of conformity for successful conformity assessments.

7.1.9 The ACAA shall manage the resolution of technical and procedural issues arising from the execution of the Ada Conformity Assessment Process by any ACAL.

7.1.10 The ACAA shall establish liaison arrangements with appropriate standards organizations to provide defect reports arising from conformity testing activities.

7.1.11 The ACAA shall maintain a publicly available list of Ada language processors that have been assessed as conforming by an ACAL in accordance with this international standard.

7.1.12 The ACAA shall produce and maintain the Ada Conformity Assessment Procedure (ACAP) in collaboration with the ACALs.

7.1.13 The ACAA shall establish an expiration policy for certificates of conformity and shall document this policy in the ACAP.

8 Ada Conformity Assessment Process

The process of assessing conformity applies the test method to Ada language processors. This clause specifies the requirements on this process when it is performed by an ACAL that documents the results in a test report and possibly a certificate of conformity. This clause also specifies requirements on the process to certify the conformity of processors that are closely related to processors tested by an ACAL.

The test method of ascertaining conformity of an Ada language processor consists of

a) a test suite (ACATS) of correct and incorrect Ada programs to be submitted to the processor for analysis and execution, where appropriate;
b) documentation of the test suite, describing test classes, test objectives for each individual test, applicability of individual tests to certain classes of configurations for which the Ada language processor is intended, instructions on how to run the test suite, and the expected results of running the individual tests on a conforming processor;

c) the Ada Conformity Assessment Procedure (ACAP) to be established and documented cooperatively by the ACAA and the ACALs, detailing the Ada Conformity Assessment Process within the framework set by this international standard. In particular, the ACAP includes unambiguous instructions on the interpretation of the results to be obtained by running the test suite on a conforming processor.

8.1 General requirements

8.1.1 The Ada language processor to be tested, including selected options, and the configuration relevant to the testing shall be fully specified. [ISO TR 9547, 3.1]

8.1.2 A single copy of the Ada language processor shall be tested on a single configuration, using a uniform setting of its options. [ISO TR 9547, 3.2]

NOTE But note subclause 8.2.7.

8.1.3 The information given in the required documents should be inspected for conformity to the language standard and should be compared with the results of testing. [ISO TR 9547, 4.3.1]

8.1.4 The output from the Ada language processor that has been tested with the test suite shall be analysed in accordance with clearly defined rules set forth in the ACAP. These rules shall give criteria for objective evaluation of all possible outputs, which may include no output at all, for each test program in the test suite. [ISO TR 9547, 4.3.1]

8.1.5 The results of testing conformity to the standard shall be analysed and compiled in a test report. The report shall provide and summarise all the information pertaining to the testing of conformity to the language standard (set up of testing, actual testing, major events during testing). The test report shall report on the outcome of all tests in the applicable test suite. [ISO TR 9547, 4.3.1]

8.1.6 There should be no exclusivity or intellectual property rights affecting the use of the test suite, test tools, or test method. [ISO TR 9547, 8.1(5)]

8.1.7 The test method shall be flexible enough to allow for all configurations on which processors may be tested. In any case, conformity shall be determined solely on the basis of the test suite and should not be dependent on the ability to utilise any particular tool. [ISO TR 9547, 8.1(6)]

8.1.8 The provisions made in this international standard and the ACAP for dealing with questions concerning defects in the test suite and interpretations of the standard shall be followed. [ISO TR 9547, 8.1(9)]

8.2 Conduct of the testing

8.2.1 General requirements

8.2.1.1 Clause 1.1.3 of ISO/IEC 8652 identifies a Core Language, to which any Ada language processor must conform, and several Specialised Needs Annexes, to which a processor may conform individually. Correspondingly, Ada conformity testing shall assess conformity of any processor to the Core Language, and conformity to individual Specialised Needs Annexes only for those processors, for which such conformity has been declared by the manufacturer of the processor.

8.2.1.2 Conformity testing shall be performed by an ACAL in accordance with the ACAP and under the terms of a formal agreement with a client. The client will normally, but need not, be the manufacturer of the Ada language processor to be tested.

8.2.1.3 Conformity testing shall include the following steps, described in subsequent subclauses:
a) obtaining a customised test suite and self-testing
b) optional evaluation of self-test results by the ACAL
c) witness testing
d) documentation of the results of testing
e) issuing the certificate of conformity, if applicable

8.2.2 Obtaining a customised test suite and self-testing

8.2.2.1 The ACAL shall prepare a customisation of the ACATS suitable for use with the processor under test, using information provided by the client.

8.2.2.2 The client shall perform a self-testing of the processor by running the customised copy of the ACATS on it.

8.2.3 Evaluation of self-test results

8.2.3.1 The client may submit the results of the self-testing to the ACAL for evaluation. The format of the submitted results shall be specified by the ACAL.

8.2.3.2 An ACAL may require the submission of self-test results for evaluation prior to witness testing.

8.2.3.3 The client shall provide sufficient information with submitted self-test results to permit the ACAL to identify the processor under test, along with the expected circumstances and results of witness testing.

8.2.3.4 The ACAL shall evaluate the submitted results of the self-testing and notify the client of the result of the evaluation.

8.2.3.5 The ACAL shall facilitate the identification, submission to the ACAA, and resolution of any test issues arising before or during the evaluation of self-test results. The ACAP shall specify the types of issues that may be resolved by the ACAL without submitting them to the ACAA. Issues whose resolution depends on interpretation of ISO/IEC 8652 shall be resolved only by the ACAA.

8.2.4 Witness testing

The process by which an ACAL assesses conformity of an Ada language processor is termed witness testing. Witness testing is a required step of conformity testing. This subclause specifies the related requirements.

8.2.4.1 Witness testing shall take place in the physical presence of qualified ACAL personnel and under its constant supervision.

8.2.4.2 The ACAL shall verify the identification of the configuration.

8.2.4.3 The ACAL shall verify the identification of the processor.

8.2.4.4 The ACAL shall observe the loading of its customisation of the ACATS onto the host system of the configuration under test.

8.2.4.5 The customised ACATS used in witness testing shall include only tests that examine conformity to the Core Language and to Specialised Needs Annexes of ISO/IEC 8652, to which the client has claimed conformity of the Ada language processor.

8.2.4.6 The entire customised ACATS shall be run on a single copy of the Ada language processor on a single configuration, applying a single set of option settings of the Ada language processor.

8.2.4.7 The ACAL shall monitor all activities needed for running the customised ACATS on the processor on both the host and target system of its configuration.
8.2.4.8 The ACAL shall evaluate the results of running the customised ACATS on the processor under test. The witness testing shall be successful only if the evaluation of all tests shows conformity.

8.2.4.9 The client shall provide a written Declaration of Conformity, signed by an authorised officer of the manufacturer of the Ada language processor, stating that the manufacturer has no knowledge of an intentional deviation from the standard in the Ada language processor under test.

8.2.5 Documentation of test results

8.2.5.1 The ACAL shall prepare a draft test report on the outcome of the witness testing.

8.2.5.2 The test report shall conform to the requirements of subclause 6.1.6, Certificates and reports.

8.2.5.3 The ACAL shall provide the client with the opportunity to review the draft test report.

8.2.5.4 The ACAL shall update the draft test report to account for client comments as appropriate.

8.2.5.5 If the ACAL determines that witness testing is successfully completed, then it shall present the revised test report for ACAA review and agreement.

8.2.5.6 If the ACAL determines that the results of witness testing reveal non-conformity, the ACAL shall document the (unsatisfactory) results of testing in the test report and shall deliver a copy to the client only.

8.2.5.7 By default, the test report of a successful assessment and the associated certificate of conformity, if issued, shall be publicly available. A written request for confidentiality by a client or manufacturer to the testing ACAL shall, however, be honoured by the ACAL and ACAA by suppressing all public information about the assessment.

8.2.6 Issuing the Certificate of Conformity

8.2.6.1 Each ACAL shall establish a policy of whether it will issue certificates of conformity. If an ACAL does elect to issue certificates, the provisions of this subclause apply.

NOTE It is recognised that a requirement to provide a certificate of conformity would not be implementable by all ISO and IEC member bodies because of national, legal or other provisions. [ISO/IEC Guide 23, 8]

8.2.6.2 Upon determination that the processor under test has successfully completed witness testing, as specified in all applicable procedures documents and the ACATS documentation, the ACAL shall produce and sign a certificate of conformity and present it to the ACAA for its concurrence and signature.

8.2.6.3 A certificate of conformity shall not be issued for any processor for which a test result indicates a non-conformity to the Core Language, unless otherwise determined by the ACAA test issue resolution process.

8.2.6.4 The ACAL shall deliver the certificate of conformity and a signed copy of the test report to the client.

8.2.7 Certification of closely related processors

It is recognised that witness testing is an expensive process, that language processors are subjected to ongoing perfective and adaptive maintenance, and that testing can not possibly be conducted on all configurations, on which the processor can be reasonably expected to show identical behaviour. Therefore a process is established that allows conveying the status of a conforming, witness-tested Ada language processor to closely related processors operating on a range of compatible configurations. This subclause specifies the primary requirements for this process.

8.2.7.1 The ACAP shall specify the requirements and means of extending the certified status of an ACAL-tested processor for a given configuration to the same processor operating on closely related configurations. This Certification By Extension shall require:

— that the manufacturer file a Declaration of Conformity with the respective ACAL, specifying the range of configurations;
— that the target instruction set architecture and target operating system of the additional configurations be the same as or a superset of those of the ACAL-tested processor;

— that the receiving ACAL and the ACAA do not find the claim of compatible configurations unreasonable by applying the general perception of the computer market rather than an in-depth analysis.

8.2.7.2 The ACAP shall specify the requirements and means of extending the certified status of an ACAL-tested processor to another, closely related (“derived”) processor, obtained by perfection or adaptive maintenance, on the same or closely related configurations. This Certification By Derivation shall require:

— that the manufacturer file a Declaration of Conformity with the respective ACAL, specifying the range of configurations;

— that the processor be derived from the tested processor by performing maintenance activities, including adaptations to different host configurations;

— that the client certify that it has tested the derived processor on one configuration and that the test results are equivalent to those obtained by the ACAL when witness-testing the processor from which this processor is derived, and substantiate this claim as requested by the ACAL;

— that the target instruction set architecture and target operating system of any additional configurations be the same as or a superset of those of the tested processor;

— that the receiving ACAL and the ACAA do not find the claim of compatible configurations unreasonable by applying the general perception of the computer market rather than an in-depth analysis.

8.2.7.3 The ACAP shall define equivalent test results in such a way as to require:

— that the testing of the derived processor uses the same customised ACATS as the ACAL used for witness-testing of the tested processor, with limited modifications defined in the ACAP;

— that every test passed by the ACAL-tested processor is also passed by the derived processor.

8.3 Test issue management

8.3.1 The ACAA shall arbitrate procedural issues brought to it by an ACAL and a client in a timely manner.

8.3.2 The ACAA shall analyse technical test issues, submit them to advisory groups as needed, and issue resolutions of the issues in a timely manner. [ISO TR 9547, 8.1(9)]

8.3.3 ACAA test issue resolutions shall include, but not be limited to, the following categories:

— rejection: the test must be processed satisfactorily according to the applicable documents and procedures;

— test withdrawal: the test is found to be flawed and is no longer to be used for conformity testing (a corrected version may be reintroduced at some later time);

— modification: the test code, processing, or evaluation is modified.

8.3.4 The ACAA shall maintain public lists of withdrawn and modified tests. Whenever the ACAA resolves a test issue that results in the withdrawal or modification of a test, it shall add the test to the appropriate one of these lists. Each entry on the list of modified tests shall specify an effective date. As of the effective date, all conformity assessments must respect the change denoted by that entry. The effective date shall be chosen to minimise the negative impact on conformity assessments in progress. In general, the effective date should be no less than three months after publication.
8.4 Marks of conformity

This international standard does not deal with marks of conformity. Adoption of such marks is left to the individual ACAL. It is recommended, however, that, if marks of conformity are issued for conforming Ada language processors, such marks be issued to processors certified by extension or derivation as well.

9 Ada Conformity Assessment Procedure (ACAP)

Throughout this international standard reference is made to and requirements are imposed on the ACAP. The ACAP is described in a document developed cooperatively by the ACAA and the ACALs. It provides detailed provisions, instructions, requirements and descriptions of processes regarding all aspects of the Ada Conformity Assessment Process. It is intended to ensure utmost commonality of the Ada Conformity Assessment Process, regardless of which ACAL performs the assessment. The ACAP is a framework on which the operating procedures of each ACAL shall be based.

9.1 General requirements

9.1.1 The ACAP shall contain sufficient detail to ensure that all aspects of the Ada Conformity Assessment Process that may impact the result of the assessment are handled identically regardless of which ACAL performs the process.

9.1.2 The ACAP shall be publicly available.

9.1.3 The ACAP shall be reviewed periodically and adjusted as needed to cover previously unforeseen issues.

10 Ada Conformity Assessment Test Suite (ACATS)

10.1 General requirements

10.1.1 A single test suite shall be maintained by the ACAA and used by each ACAL in performing its work. The initial test suite shall be the current version of the test suite known as the “Ada Compiler Validation Capability (ACVC)” test suite that has been in use for assessing conformity of Ada processors since 1983 and is in general conformity with the provisions of this clause.

10.1.2 Revisions of the test suite should be undertaken as deemed necessary by the ACALs and upon any revision of the Ada language standard. [ISO TR 9547, 8.1.(8)]

10.1.3 The test suite shall be designed to test conformity of processors by submitting test programs to them. Each test shall exercise some rules of the language standard and their interaction. The test suite shall be designed for conformity testing and not for assessing other aspects of the Ada language processor. [ISO TR 9547, 4.1]

10.1.4 The test suite should cover all aspects of the language standard and should investigate implementation issues only as far as conformity is concerned. [ISO TR 9547, 4.1]

10.1.5 The test suite should not be too large; the economical aspects should be taken into account (e.g. relative costs of conformity versus development cost of an implementation.) [ISO TR 9547, 4.1]

10.1.6 The test suite shall be written in such a way that it can be readily maintained under version control and subject to a review procedure. [ISO TR 9547, 4.1]

10.1.7 The test suite shall be designed so as to take into account the separable conformity to Specialised Needs Annexes of ISO/IEC 8652. Thus the test suite shall be modular. [ISO TR 9547, 4.1]

10.1.8 The test suite shall contain test programs that are in accordance with the rules of the language standard. It shall also contain test programs that are not in accordance with the rules of the language standard,
in those situations where the language standard specifies syntactic or semantic properties that must be rejected. Test programs to be rejected should clearly identify the offending constructs. Test programs that must not be rejected shall be made as far as possible self-checking and hence report the success or failure by a message. [ISO TR 9547, 4.1]

10.1.9 The execution of the test programs shall be practical. The execution of the test suite should not take too much time, should not use excessive system resources, and should not cost too much to run. [ISO TR 9547, 8.1(4).]

10.1.10 The test programs shall, as far as possible, be independent of each other, and their sequence of execution shall not influence each other’s results. [ISO TR 9547, 4.1]

10.1.11 Each test program should have a single objective related to the standard’s requirements.

10.1.12 Each test program shall have a unique identifier.

10.2 Design of test suite

10.2.1 Each test program should be written in such a way that its understanding is facilitated by the use of clear documentation in it that includes:

— comments that are clear, concise;

— reference to clauses of the language standard;

— clear statements of assumptions made in test suite design. [ISO TR 9547, 5.2]

10.2.2 The test suite should be written in such a way that its understanding is facilitated by the use of clear coding style.

10.2.3 The test suite should be written in such a way that it is very easily adapted to technical aspects specified in the language standard that are implementation defined, for example:

— implementation parameters (for example, use of the largest integer supported);

— maximum and minimum parameter values with a reasonable selection in between (for instance, measure of depth nesting);

— use of features that are optional;

— numeric precision;

— use of files and external data;

— input and output facilities. [ISO TR 9547, 5.2]

10.2.4 The test suite should be written in such a way as to minimise the use of features which could be restricted by configuration or implementation characteristics. Where such features are used in the test suite for assessing other aspects of conformity, reasonableness should be exercised with regard to capacity limitations (e.g., numerical values, size of arrays). [ISO TR 9547, 5.2]

10.2.5 The test suite should be also designed to use a minimum set of simple constructs of the language to establish a context in which to test advanced features. The latter should only be used where specifically needed in a particular testing purpose. Test programs that do not conform to the language standard should deviate from it only as necessary in order to satisfy specific testing objectives. [ISO TR 9547, 5.2]

10.2.6 The test suite should be portable to different configurations. A small configuration should not be penalised. Thus, each single program should be able to run on a small configuration, as well as on a large one. The result of testing (i.e., pass or fail) should not be influenced by the program’s size. [ISO TR 9547, 5.6]
10.2.7 The ACATS documentation and internal test documentation shall clearly specify the criteria for determining the result of each test. The result of applying these criteria shall indicate that the test is passed, failed, or not applicable to the processor under test. The interpretation of these results as pertains to conformity may be determined by ACAA issue resolutions and other conditions specified in the ACAP.

10.2.8 Where features of the language are not covered by the test suite, the test suite documentation should include a statement (or list) to this effect. [ISO TR 9547, 5.4]

10.2.9 Special care should be taken to document the extension testing strategy (if any) in the test suite. [ISO TR 9547, 5.4]

10.3 Maintenance and revision of the test suite

10.3.1 Provisions shall be made by the ACAA for maintenance and revision of the ACATS through a public review and according to a published timetable. [ISO TR 9547, 6]

10.3.2 For substantive additions to the ACATS there shall be a public review period of at least six months.

10.3.3 There shall be a clearly defined date by which substantive additions or modifications to the ACATS are applied in conformity testing.

10.4 Availability of the test suite

10.4.1 The ACATS and tools shall be available in one or more formats that are generally used within the industry. Consideration should be given to the use of ISO standards. [ISO TR 9547, 7]

10.4.2 The ACATS and its documentation shall be made available to the general public for a cost not to exceed the cost of reproduction and shipment.
Annex A
(informative)

Bibliography

ISO TR 9547:1988, Programming Language Processors--Test Methods--Guidelines for their Development and Acceptability