

ISA-RP55.1-1975 (R 1983)

Approved October 30, 1983

Recommended Practice



Hardware Testing of Digital Process Computers



ISA-RP55.1 — Hardware Testing of Digital Process Computers

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Preface

This Foreword, all footnotes and all Appendices are included for informational purposes and are not part of Standard ISA-RP55.1.

This Recommended Practice has been prepared as a part of the service of ISA toward a goal of uniformity in the field of instrumentation. To be of real value this document should not be static but should be subjected to periodic review. Toward this end the Society welcomes all comments and criticisms and asks that they be addressed to the Standards and Practices Board Secretary, ISA, 67 Alexander Drive, P.O. Box 12277, Research Triangle Park, North Carolina 27709. Telephone (919) 549-8411, e-mail: standards@isa.org.

During the 22nd Annual ISA Conference and Exhibit (Chicago, September, 1967) a workshop consisting of users experienced in digital process control convened under the auspices of the ISA Chemical and Petroleum Industries Division. The product of the workshop was a document titled "Consensus of Process Computers Users Workshop — Factory Hardware Witness Test Guidelines for Digital Process Computers." (References to the factory and witnessing were subsequently eliminated considering that the tests could be alternatively performed at the user's site and that documentation or other forms of compliance may be agreed upon.) The document was then mailed to digital process computer vendors, soliciting their comments.

Some of the underlying causes and needs that led to writing of that document were explained in a talk by Mr. Kirwin Whitman (workshop secretary) at the 9th National ISA Chemical & Petroleum Instrumentation Symposium (Wilmington, Delaware, April, 1968). This talk was subsequently published in the June, 1968, issue of *INSTRUMENTATION TECHNOLOGY*, and considerable industry response resulted. Therefore, a second workshop was held at the 23rd Annual ISA Conference and Exhibit (New York City, October, 1968) and included both users and vendors. The workshop resulted in consensus between users and vendors that a digital process computer hardware test standard was needed and what the scope and objective of the standard should be. A working committee composed of both users and vendors was formed to write the desired standard. The National Committee began meeting bimonthly starting in December, 1968; and six subcommittees (later increased to eleven) met in alternate months. In January, 1969, the ISA Standards and Practices Department gave official sanction to the committee, designating it as SP-55, Hardware Testing of Digital Process Computers.

The purpose has been to create a standard to serve as a guide for technical personnel whose duties include specifying, testing or demonstrating hardware performance of digital process computers. Basing engineering and hardware specifications, technical advertising and reference literature on this standard (or by referencing portions thereof, as applicable) will provide a uniform interpretation of the digital process computer's performance capabilities and the methods used for evaluating and documenting proof of performance. Adhering to the terminology, definitions and test recommendations developed will result in clearer specifications which should further the understanding between vendors and users.

The ISA Standards and Practices Department is aware of the growing need for attention to the metric system of units in general, and the International System of Units (SI) in particular, in the preparation of instrumentation standards. The Department is further aware of the benefits to users of ISA Standards in the USA of incorporating suitable references to the SI (and the metric system) in their business and professional dealings with other countries. Toward this end this Department will endeavor to introduce SI and SI-acceptable metric units as optional alternatives to English units in all new and revised standards to the greatest extent possible. *The Metric*

Practice Guide, which has been published by the American Society for Testing and Materials as ASTM E380-70, and future revisions, will be the reference guide for definitions, symbols, abbreviations and conversion factors.

The ISA Standards Committee on Hardware Testing of Digital Process Computers, SP55, operates within the ISA Standards and Practices Department, L. N. Combs, Vice-President. The persons listed below served as members of this Committee:

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The assistance of those who aided in the preparation of this Standard, by their critical review of the first draft, by offering suggestions toward its improvement, and in other ways, is gratefully acknowledged. In addition to SP55 committee members, the following have reviewed this Standard in its draft version and have thus served as a Board of Review. They have indicated their general concurrence with this Standard; however, it should be noted that, they have acted as individuals and their approval does not necessarily constitute approval by their company or facility.

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1 Scope

This ISA Recommended Practice establishes a basis for evaluating functional hardware performance of digital process computers. A process computer is typically characterized by the capability to acquire real-time data from a process in analog or digital form. In addition, a process computer generally has the capability to provide analog and digital control signals to the process.

This Recommended Practice covers general recommendations applicable to all hardware performance testing, specific tests for pertinent subsystems and system parameters, and a brief glossary defining terms used in this Recommended Practice. It identifies the tests to be considered and, in most cases, provides recommended procedures. Detailed specifications are necessary to define system acceptance criteria. Such specifications shall be negotiated between the vendor and user before the system is contracted.

The tests may be performed at the vendor's factory, the user's site or other suitable location. Furthermore, alternate methods of compliance such as certification or documentation of tests may be considered in place of directly performing the tests. Only equipment provided by the computer system vendor is within the scope of the Recommended Practice. Generally, this includes that equipment from the input terminations to the output terminations of the computer system.

The scope of this Recommended Practice does not include computer software testing, although certain software is necessary to perform the hardware tests. The tests do not evaluate reliability or availability. Destructive testing shall not be performed unless specifically agreed to by the vendor and user. It is also not intended that the Recommended Practice encompass interconnected multi-computer systems. These systems involve unique complexities, primarily in their software and interconnecting hardware, which were not specifically considered in the preparation of this Recommended Practice.

2 Factors to be considered

2.1 Use of the standard

The main intent of this Recommended Practice is to develop a common basic medium of communication between vendor and user. This is why it consists of the framework for a basic nucleus of tests. It is not the intent of this document to establish specifications or to set specific acceptance criteria because of the many differences which exist both in vendor product design and in user requirements.

All details of testing a specific computer system shall be negotiated before the system is contracted. A vendor's response to the requirements of this standard should be evaluated very carefully. Computer technology and methods of testing vary greatly between vendors and are continually changing. It is not the intent to label these recommended tests as the "State of the Art" or to use the Recommended Practice to prejudice a vendor or product.