



**International
Standard**

ISO/IEC 18031

**Information technology —
Security techniques — Random bit
generation**

*Technologies de l'information — Techniques de sécurité —
Génération de bits aléatoires*

**Third edition
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Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols	7
5 Properties and requirements of a random bit generator	8
5.1 Properties of a random bit generator.....	8
5.2 Requirements of an RBG.....	9
5.3 Additional information for an RBG.....	10
6 RBG model	10
6.1 Conceptual functional model for random bit generation.....	10
6.2 RBG basic components.....	11
6.2.1 Introduction to the RBG basic components.....	11
6.2.2 Randomness source.....	11
6.2.3 Additional inputs.....	12
6.2.4 Internal state.....	12
6.2.5 Internal state transition functions.....	13
6.2.6 Output generation function.....	14
6.2.7 Health test.....	15
7 Types of RBGs	15
7.1 Introduction to the types of RBGs.....	15
7.2 Non-deterministic random bit generators.....	16
7.3 Deterministic random bit generators.....	17
7.4 The RBG spectrum.....	17
8 Overview and requirements for an NRBG	17
8.1 NRBG overview.....	17
8.2 Functional model of an NRBG.....	18
8.3 NRBG entropy sources.....	20
8.3.1 General.....	20
8.3.2 Primary entropy source for an NRBG.....	20
8.3.3 Physical entropy sources for an NRBG.....	22
8.3.4 NRBG non-physical entropy sources.....	22
8.3.5 NRBG additional entropy sources.....	23
8.3.6 Hybrid NRBGs.....	24
8.4 NRBG additional inputs.....	24
8.4.1 NRBG additional inputs overview.....	24
8.4.2 Requirements for NRBG additional inputs.....	24
8.5 NRBG internal state.....	25
8.5.1 NRBG internal state overview.....	25
8.5.2 Requirements for the NRBG internal state.....	25
8.5.3 Additional information for the NRBG internal state.....	26
8.6 NRBG internal state transition functions.....	26
8.6.1 NRBG internal state transition functions overview.....	26
8.6.2 Requirements for the NRBG internal state transition functions.....	27
8.6.3 Recommendations for the NRBG internal state transition functions.....	27
8.7 NRBG output generation function.....	27
8.7.1 NRBG output generation function overview.....	27
8.7.2 Requirements for the NRBG output generation function.....	28
8.8 NRBG health tests.....	28
8.8.1 NRBG health tests overview.....	28
8.8.2 General NRBG health test requirements.....	29

ISO/IEC 18031:2025(en)

8.8.3	NRBG health test on deterministic components.....	29
8.8.4	NRBG health tests within entropy sources.....	30
8.8.5	NRBG health tests on random output.....	31
8.9	NRBG component interaction.....	32
8.9.1	NRBG component interaction overview.....	32
8.9.2	Requirements for NRBG component interaction.....	32
8.9.3	Recommendations for NRBG component interaction.....	33
9	Overview and requirements for a DRBG.....	33
9.1	DRBG overview.....	33
9.2	Functional model of a DRBG.....	33
9.3	DRBG randomness source.....	36
9.3.1	Primary randomness source for a DRBG.....	36
9.3.2	Generating seed values for a DRBG.....	37
9.3.3	Additional randomness sources for a DRBG.....	38
9.3.4	Hybrid DRBGs.....	38
9.4	Additional inputs for a DRBG.....	38
9.5	Internal state for a DRBG.....	39
9.6	Internal state transition function for a DRBG.....	39
9.7	Output generation function for a DRBG.....	40
9.8	Health tests for a DRBG.....	40
9.8.1	DRBG health tests overview.....	40
9.8.2	DRBG health test.....	41
9.8.3	DRBG deterministic algorithm test.....	41
9.8.4	DRBG software/firmware integrity test.....	41
9.8.5	DRBG critical functions test.....	41
9.8.6	DRBG software/firmware load test.....	41
9.8.7	DRBG manual key entry test.....	42
9.8.8	Continuous tests on noise sources in entropy sources.....	42
9.9	Additional requirements for DRBG keys.....	42
	Annex A (normative) Combining RBGs.....	44
	Annex B (normative) Conversion methods for random number generation.....	45
	Annex C (informative) Deterministic random bit generators.....	48
	Annex D (informative) NRBG examples.....	75
	Annex E (informative) Security considerations.....	84
	Annex F (informative) Discussion on the estimation of entropy.....	88
	Annex G (informative) RBG assurance.....	89
	Annex H (normative) RBG boundaries.....	90
	Annex I (informative) Rationale for the design of statistical tests.....	92
	Bibliography.....	93

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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This document was prepared by Joint Technical Committee ISO/IEC/JTC 1 *Information Technology*, Subcommittee SC 27, *Information security, cybersecurity and privacy protection*.

This third edition cancels and replaces the second edition (ISO/IEC 18031:2011), which has been technically revised. It also incorporates the Amendment ISO/IEC 18031:2011/Amd 1:2017 and the Technical Corrigendum ISO/IEC 18031:2011/Cor 1:2014.

The main changes are as follows:

- removal of the MQ_DRBG, Micali-Schnorr DRBG, Dual_EC_DRBG and SHA-1;
- addition and harmonization of the terms and definitions in [Clause 3](#);
- addition of conversion methods for random number generation;
- update of the requirements for DRBGs and NRBGs.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

This document sets out specific requirements that, when met, will result in the development of a random bit generator that can be applicable to cryptographic applications.

Numerous cryptographic applications involve the use of random bits. These cryptographic applications include the following:

- random keys and initialization values (*IVs*) for encryption,
- random keys for keyed MAC algorithms,
- random private keys for digital signature algorithms,
- random values to be used in entity authentication mechanisms,
- random values to be used in key-establishment protocols,
- random PINs and passwords,
- nonces.

The purpose of this document is to establish a conceptual model, terminology and requirements related to the building blocks and properties of systems used for random bit generation in or for cryptographic applications.

It is possible to categorize random bit generators into two types, namely, non-deterministic and deterministic random bit generators.

A non-deterministic random bit generator can be defined as a random bit generating mechanism that continuously uses a source of entropy to generate a random bit stream.

A deterministic random bit generator can be defined as a bit generating mechanism that uses deterministic mechanisms such as cryptographic algorithms to generate a random bit stream. In this type of bit stream generation, there is a specific input (normally called a seed) and perhaps some optional input, which, depending on its application, can either be publicly available or not. The seed is processed by a function which provides an output.

NOTE This document also discusses hybrid random bit generators, which incorporate elements of both non-deterministic and deterministic generators.

In this document, variable symbols and variable descriptive terms are given in italic font.

Information technology — Security techniques — Random bit generation

1 Scope

This document specifies a conceptual model for a random bit generator for cryptographic purposes, together with the elements of this model.

This document specifies the characteristics of the main elements required for both non-deterministic and deterministic random bit generators. It also establishes the security requirements for both non-deterministic and deterministic random bit generators.

Techniques for statistical testing of random bit generators for the purposes of independent verification or validation and detailed designs for such generators are outside the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 9797-2, *Information security — Message authentication codes (MACs) — Part 2: Mechanisms using a dedicated hash-function*

ISO/IEC 10118-3, *IT Security techniques — Hash-functions — Part 3: Dedicated hash-functions*

ISO/IEC 19790, *Information technology — Security techniques — Security requirements for cryptographic modules*

ISO/IEC 20543, *Information technology — Security techniques — Test and analysis methods for random bit generators within ISO/IEC 19790 and ISO/IEC 15408*

ISO/IEC 29192-5, *Information technology — Security techniques — Lightweight cryptography — Part 5: Hash-functions*