



ANSI/EIA-60050-192-2017
Approved: September 21, 2017

EIA STANDARD

EIA-60050-192

International Electrotechnical Vocabulary – Part 192: Dependability

EIA-60050-192
(IEC 60050-192:2015, IDT)

September 2017



Electronic Components Industry Association

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This document is the EIA Standard EIA-60050-192-2017: *International Electrotechnical Vocabulary – Part 192: Dependability*.

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(From Standards Proposal No. 5391.01, formulated under the cognizance of the ECIA Dependability Standards Committee).

Published by

©Electronic Components Industry Association 2017
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2214 Rock Hill Road, Suite 265
Herndon, VA 20170

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INTERNATIONAL ELECTROTECHNICAL VOCABULARY –

Part 192: Dependability

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60050-192 has been prepared by IEC technical committee 56: Dependability, under the responsibility of IEC technical committee 1: Terminology.

This first edition cancels and replaces the first edition of IEC 60050-191:1990, sections 191-01 to 191-20, IEC 60050-191:1990/AMD1:1999, entries in sections 191-01 to 191-20 and IEC 60050-191:1990/AMD2:2002. It constitutes a technical revision. It has the status of a horizontal standard in accordance with IEC Guide 108.

This part of IEC 60050 includes the following significant technical changes with respect to the IEC 60050-191:

- a) inclusion of terms more commonly used by practitioners;
- b) provision of figures to help explain definitions of time-related concepts.

The text of this standard is based on the following documents:

FDIS	Report on voting
1/2254/FDIS	1/2256/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this part of the IEV, the terms and definitions are provided in French and English; in addition the terms are given in Arabic (ar), Czech (cs), German (de), Spanish (es), Japanese (ja), Polish (pl), Portuguese (pt) and Chinese (zh).

A list of all parts of the IEC 60050 series, published under the general title *International Electrotechnical Vocabulary*, can be found on the IEC website and is available at www.electropedia.org.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under webstore.iec.ch in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

Principles and rules followed

General

The IEV (IEC 60050 series) is a general purpose multilingual vocabulary covering the field of electrotechnology, electronics and telecommunication (available at www.electropedia.org). It comprises about 20 000 *terminological entries*, each corresponding to a *concept*. These entries are distributed among about 80 *parts*, each part corresponding to a given field.

EXAMPLE

Part 161 (IEC 60050-161): Electromagnetic compatibility

Part 411 (IEC 60050-411): Rotating machines

The entries follow a hierarchical classification scheme Part/Section/Concept; within the sections, the concepts are organized in a systematic order.

The terms and definitions (and possibly non-verbal representations, examples, notes to entry and sources) in the entries are given in two or more of the three IEC languages, that is French, English and Russian (*principal IEV languages*).

In each entry, the terms alone are also given in several of the *additional IEV languages* (Arabic, Chinese, Finnish, German, Italian, Japanese, Norwegian, Polish, Portuguese, Serbian, Slovenian, Spanish and Swedish).

Organization of a terminological entry

Each of the entries corresponds to a concept, and comprises:

- an *entry number*,
- possibly a *letter symbol for the quantity or unit*,

then, for the principal IEV languages present in the part:

- the term designating the concept, called "*preferred term*", possibly accompanied by *synonyms* and *abbreviations*,
- the *definition* of the concept,
- possibly *non-verbal representations, examples* and *notes to entry*,
- possibly the *source*,

Entry number

The entry number is comprised of three elements, separated by hyphens:

Part number: 3 digits,

Section number: 2 digits,

Concept number: 2 digits (01 to 99).

EXAMPLE **131-13-22**

Letter symbols for quantities and units

These symbols, which are language independent, are given on a separate line following the entry number.

EXAMPLE

131-12-04

R

resistance

Preferred term and synonyms

The preferred term is the term that heads a terminological entry in a given language; it may be followed by synonyms. It is printed in boldface.

Synonyms:

The synonyms are printed on separate lines under the preferred term: preferred synonyms are printed in boldface, and deprecated synonyms are printed in lightface. Deprecated synonyms are prefixed by the text "DEPRECATED:".

Absence of an appropriate term:

When no appropriate term exists in a given language, the preferred term is replaced by five dots, as follows:

"....." (and there are of course no synonyms).

Attributes

Each term (or synonym) may be followed by attributes giving additional information, and printed in lightface on the same line as the corresponding term, following this term.

EXAMPLE

specific use of the term:

transmission line, <in electric power systems>

national variant:

lift, GB

grammatical information:

quantize, verb

transient, noun

AC, adj

Source

In some cases, it has been necessary to include in an IEV part a concept taken from another IEV part, or from another authoritative terminology document (ISO/IEC Guide 99, ISO/IEC 2382, etc.), either with or without modification to the definition (and possibly to the term).

This is indicated by the mention of this source, printed in lightface, and placed at the end of the entry in each of the principal IEV languages present.

EXAMPLE SOURCE: IEC 60050-131:2002, 131-03-13, modified

INTERNATIONAL ELECTROTECHNICAL VOCABULARY –

Part 192: Dependability

1 Scope

This part of IEC 60050 gives the general terminology used in the field of dependability.

The terms are generic and are applicable to all fields of dependability methodology, including electrotechnical applications.

The document is not an exhaustive vocabulary for all IEC standards in the dependability field: definitions for some specialized terms may only be found in the relevant standards.

This document is based on IEC 60050-191:1990, which has been subjected to a systematic, in-depth review and revision, in order to:

- reflect the current usage of the terms in the dependability field;
- introduce new terms from new or revised standards, and other informed sources; and
- provide a grammatical form, and presentation to comply with the IEC directives.

In producing this document, several sections of IEC 60050-191:1990 (formerly Chapter 191) concerning quality of service, have been omitted:

- sections 19 and 20: Quality of service in telecommunications, has been adopted and developed by the International Telecommunication Union, as publication ITU-T E.800, *Definitions of terms related to quality of service*; and
- sections 21 to 30, inclusive: Quality of service in electric power systems is to be developed as a new document, IEC 60050-692¹.

It has the status of a horizontal standard in accordance with IEC Guide 108, *Guidelines for ensuring the coherency of IEC publications – Application of horizontal standards*.

This terminology is consistent with the terminology developed in the other specialized parts of the IEV.

This horizontal standard is primarily intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 108.

One of the responsibilities of a technical committee is, wherever applicable, to make use of horizontal standards in the preparation of its publications. The content of this horizontal standard will not apply unless specifically referred to or included in the relevant publications.

2 Terms and definitions

The terms and definitions contained in this part of IEC 60050 were extracted from the Electropedia www.electropedia.org) (also known as the "IEV Online") – the world's most comprehensive online terminology database covering the field of electrotechnology, electronics and telecommunication.

¹ Under consideration.

SECTION 192-01 – BASIC CONCEPTS

192-01-01

item

subject being considered

Note 1 to entry: The item may be an individual part, component, device, functional unit, equipment, subsystem, or system.

Note 2 to entry: The item may consist of hardware, software, people or any combination thereof.

Note 3 to entry: The item is often comprised of elements that may each be individually considered. See sub item (192-01-02) and indenture level (192-01-05).

Note 4 to entry: IEC 60050-191:1990 (now withdrawn; replaced by IEC 60050-192:2015) identified the term “entity” as an English synonym, which is not true for all applications.

Note 5 to entry: The definition for item in IEC 60050-191:1990 (now withdrawn; replaced by IEC 60050-192:2015) is a description rather than a definition. This new definition provides meaningful substitution throughout this document. The words of the former definition form new note 1.

192-01-02

sub item

part of the subject being considered

Note 1 to entry: A sub item becomes the item, when individually considered.

192-01-03

system, <in dependability>

set of interrelated items that collectively fulfil a requirement

Note 1 to entry: A system is considered to have a defined real or abstract boundary.

Note 2 to entry: External resources (from outside the system boundary) may be required for the system to operate.

Note 3 to entry: A system structure may be hierarchical, e.g. system, subsystem, component, etc.

Note 4 to entry: Conditions of use and maintenance should be expressed or implied within the requirement.

SOURCE: IEC 60050-151:2001, 151-11-27, modified by extension to suit the dependability context

192-01-04

subsystem, <in dependability>

part of a system, which is itself, a system

Note 1 to entry: A subsystem is normally at a lower indenture level than the system of which it is a part.

192-01-05**indenture level**

level of sub-division within a system hierarchy

EXAMPLE System, subsystem, assembly, and component.

Note 1 to entry: From the maintenance perspective, the indenture level depends upon various factors, including the complexity of the item's construction, the accessibility of sub items, skill level of maintenance personnel, test equipment facilities, and safety considerations.

192-01-06**hardware**

physical artefact

EXAMPLE Structures; mechanical, electric and electronic components; circuits; fastenings; operator controls; and instrumentation.

192-01-07**software**

programs, procedures, rules, documentation and data of an information processing system

EXAMPLE Requirements and design specifications; source code listings, check lists and comments; "Help" text and messages for display at the computer/human interface; instructions for installation and operation; and support guides for hardware and software maintenance.

Note 1 to entry: Software is an intellectual creation that is independent of the medium upon which it is recorded.

Note 2 to entry: Software requires hardware devices to execute programs, and to store and transmit data.

Note 3 to entry: Types of software include firmware, system software, and application software.

192-01-08**process**

set of interrelated or interacting activities that transforms inputs into outputs

SOURCE: ISO 9000:2005, 3.4.1

192-01-09**life cycle**

series of identifiable stages through which an item goes, from its conception to disposal

EXAMPLE A typical system lifecycle consists of: concept and definition; design and development; construction, installation and commissioning; operation and maintenance; mid-life upgrading, or life extension; and decommissioning and disposal.

Note 1 to entry: The stages identified will vary with the application.

192-01-10

life cycle cost, <of an item>

whole life cost, <of an item>

LCC

total cost incurred during the life cycle

Note 1 to entry: See also life cycle costing (192-11-11).

192-01-11

repairable item

DEPRECATED: repaired item

item that can, under given conditions, after a failure, be returned to a state in which it can perform as required

Note 1 to entry: The "given conditions" may include technical, economic and other considerations.

Note 2 to entry: An item that is repairable under some conditions may be non-repairable under other conditions.

192-01-12

non-repairable item

DEPRECATED: non-repaired item

item that cannot, under given conditions, after a failure, be returned to a state in which it can perform as required

Note 1 to entry: The "given conditions" may include technical, economic and other considerations.

Note 2 to entry: An item that is non-repairable under some conditions may be repairable under other conditions.

192-01-13

requirement

need or expectation that is stated, generally implied or obligatory

SOURCE: ISO 9000:2005, 3.1.2

192-01-14

required function

function considered necessary to fulfil a given requirement

Note 1 to entry: The required function may be stated or implied (i.e. that the purchaser would be entitled to expect).

Note 2 to entry: The required function, by implication, also covers what the item shall not do.

Note 3 to entry: Essential internal functions of a system, which may not be visible to the user, are also required functions.

192-01-15

conformity

fulfilment of a requirement

SOURCE: ISO 9000:2005, 3.6.1

192-01-16**non conformity**

non-fulfilment of a requirement

SOURCE: ISO 9000:2005, 3.6.2

192-01-17**verification**

confirmation, through the provision of objective evidence, that specified requirements have been fulfilled

Note 1 to entry: The term “verified” is used to designate the corresponding status.

Note 2 to entry: Design verification is the application of tests and appraisals to assess conformity of a design to the specified requirement.

Note 3 to entry: In the case of software, verification is conducted at various stages of development, examining the software and its constituents to determine conformity to the requirements specified at the beginning of that stage.

SOURCE: ISO 9000:2005, 3.8.4, modified – Note 2 has been modified and Note 3 has been added

192-01-18**validation**

confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled

Note 1 to entry: The term “validated” is used to designate the corresponding status.

Note 2 to entry: The use conditions for validation can be real or simulated.

Note 3 to entry: In design and development, validation concerns the process of examining an item to determine conformity with user needs.

Note 4 to entry: Validation is normally performed during the final stage of development, under defined operating conditions, although it may also be performed in earlier stages.

Note 5 to entry: Multiple validations may be carried out if there are different intended uses.

SOURCE: ISO 9000:2005, 3.8.5, modified – Notes 3, 4 and 5 have been added

192-01-19**modification, <of an item>**

process to effect a design change

Note 1 to entry: Any action that produces a deviation from the respective design is a modification.

192-01-20**degradation, <of an item>**

detrimental change in ability to meet requirements

SEE: degraded state (192-02-25).

Note 1 to entry: Degradation may occur with storage or use, brought about by internal processes or effects of the environment.

Note 2 to entry: Degradation beyond specified limits may constitute a degraded state or failure.

Note 3 to entry: In a system context, degradation may also be caused by failures within the system.

192-01-21

durability, <of an item>

ability to perform as required, under given conditions of use and maintenance, until the end of useful life

192-01-22

dependability, <of an item>

ability to perform as and when required

Note 1 to entry: Dependability includes availability (192-01-23), reliability (192-01-24), recoverability (192-01-25), maintainability (192-01-27), and maintenance support performance (192-01-29), and, in some cases, other characteristics such as durability (192-01-21), safety and security.

Note 2 to entry: Dependability is used as a collective term for the time-related quality characteristics of an item.

192-01-23

availability, <of an item>

ability to be in a state to perform as required

Note 1 to entry: Availability depends upon the combined characteristics of the reliability (192-01-24), recoverability (192-01-25), and maintainability (192-01-27) of the item, and the maintenance support performance (192-01-29).

Note 2 to entry: Availability may be quantified using measures defined in Section 192-08, *Availability related measures*.

192-01-24

reliability, <of an item>

ability to perform as required, without failure, for a given time interval, under given conditions

Note 1 to entry: The time interval duration may be expressed in units appropriate to the item concerned, e.g. calendar time, operating cycles, distance run, etc., and the units should always be clearly stated.

Note 2 to entry: Given conditions include aspects that affect reliability, such as: mode of operation, stress levels, environmental conditions, and maintenance.

Note 3 to entry: Reliability may be quantified using measures defined in Section 192-05, *Reliability related concepts: measures*.

192-01-25

recoverability, <of an item>

ability to recover from a failure, without corrective maintenance

Note 1 to entry: The ability to recover may or may not require external actions. For recovery where no external actions are required, see self-recoverability (192-01-26).

Note 2 to entry: Recoverability may be quantified using measures such as the probability of recovery within a specified time interval.

192-01-26

self-recoverability, <of an item>

ability to recover from a failure, without external action

Note 1 to entry: Self-recoverability is a special case of recoverability (192-01-25).

192-01-27

maintainability, <of an item>

ability to be retained in, or restored to a state to perform as required, under given conditions of use and maintenance

Note 1 to entry: Given conditions would include aspects that affect maintainability, such as: location for maintenance, accessibility, maintenance procedures and maintenance resources.

Note 2 to entry: Maintainability may be quantified using measures defined in Section 192-07, *Maintainability and maintenance support: measures*.

192-01-28

maintenance support

provision of resources to maintain an item

Note 1 to entry: Resources include human resources, support equipment, materials and spare parts, maintenance facilities, documentation and information, and maintenance information systems.

192-01-29

maintenance support performance

effectiveness of an organization in respect of maintenance support

Note 1 to entry: Maintenance support performance may be quantified using measures defined in Section 192-07, *Maintainability and maintenance support: measures*.

192-01-30

integrated logistic support, <of an item>

ILS

management process to determine and co-ordinate the provision of all materials and resources required to meet the needs for operation and maintenance

192-01-31

supportability, <of an item>

ability to be supported to sustain the required availability with a defined operational profile and given logistic and maintenance resources

Note 1 to entry: Supportability of an item results from the inherent maintainability (192-01-27), combined with factors external to the item that affect the relative ease of providing the required maintenance and logistic support.

192-01-32

system software

application-independent software that supports the running of application software

EXAMPLE The operating system of a computer.

SOURCE: ISO/IEC 2382-1:1993, 01.04.02

192-01-33

application software

software that provides a direct service to the user

EXAMPLE Word processing, spreadsheet and database software.

192-01-34

computer program

set of coded instructions executed to perform specified logical and mathematical operations on data

192-01-35

firmware

software contained in a read-only memory device

EXAMPLE Basic input/output system (BIOS) of a personal computer.

Note 1 to entry: Firmware, in normal usage, is not intended for modification, and requires the hardware device containing it to be replaced or re-programmed.

192-01-36

embedded software

software within a system whose primary purpose is not computational

EXAMPLE The software in the engine management system; brake control system of a motor vehicle.

SECTION 192-02 – STATES AND TIMES

192-02-01

up state, <of an item>

available state, <of an item>

state of being able to perform as required

Note 1 to entry: The absence of necessary external resources may prevent operation, but do not affect the up state. See externally disabled state (192-02-23).

Note 2 to entry: Up state relates to the availability of the item.

Note 3 to entry: An item may be considered to be in an up state for some functions and in a down state for others, concurrently.

Note 4 to entry: The adjectives "up" and "available" designate an item in an up state.

192-02-02

up time

time interval for which the item is in an up state

192-02-03**accumulated up time**

sum of the individual up time durations within a given time interval

192-02-04**operating state, <of an item>**

state of performing as required

Note 1 to entry: The adjective “operating” designates an item in an operating state.

Note 2 to entry: In some applications, an item in an idle state is considered to be operating.

192-02-05**operating time**

time interval for which an item is in an operating state

Note 1 to entry: The duration of operating time may be expressed in units appropriate to the item concerned, e.g. calendar time, operating cycles, distance run, etc., and the units should always be clearly stated.

192-02-06**non-operating state, <of an item>**

state of not performing any required function

Note 1 to entry: The adjective “non-operating” designates an item in a non-operating state.

192-02-07**non-operating time**

time interval for which the item is in a non-operating state

192-02-08**required time**

time interval for which the item is required to be in an up state

192-02-09**non-required time**

time interval for which the item is not required to be in an up state

192-02-10**standby state, <of an item>**

non-operating up state during required time

192-02-11**cold standby state, <of an item>**

standby state requiring warm up before a demand to operate can be met

Note 1 to entry: A cold standby state may apply to redundant or stand-alone items.

Note 2 to entry: In this context “warm up” includes meeting any conditions required to operate as required (e.g. achieving the required temperature, speed, pressure).

192-02-12

hot standby state, <of an item>

standby state providing for immediate operation upon demand

Note 1 to entry: A hot standby state may apply to redundant or stand-alone items.

Note 2 to entry: In some applications, an item in a hot standby state is considered to be operating.

192-02-13

standby time

time interval for which the item is in a standby state

192-02-14

idle state, <of an item>

DEPRECATED: free state

non-operating up state during non-required time

Note 1 to entry: The adjective “idle” designates an item in an idle state.

Note 2 to entry: In some applications, an item in an idle state has some functioning subsystems, and is therefore considered to be operating.

192-02-15

idle time

DEPRECATED: free time

time interval for which the item is in an idle state

Note 1 to entry: IEC 60050-191:1990 (now withdrawn; replaced by IEC 60050-192:2015) identified “free time” as a synonym, which is not true in all applications.

192-02-16

enabled state, <of an item>

state of having all resources available to be able to perform as required, upon demand

Note 1 to entry: The adjective “enabled” designates an item in an enabled state.

192-02-17

enabled time

time interval for which the item is in an enabled state

192-02-18

disabled state, <of an item>

DEPRECATED: outage

state of being unable to perform as required, for any reason

Note 1 to entry: The adjective “disabled” designates an item in a disabled state.

Note 2 to entry: The term “outage” is deprecated, in this sense, because it is synonym of disabled time (192-02-19).

192-02-19
disabled time
outage

time interval for which the item is in a disabled state

192-02-20

down state, <of an item>
unavailable state, <of an item>
internally disabled state, <of an item>
internal disabled state, <of an item>
state of being unable to perform as required, due to internal fault, or preventive maintenance

Note 1 to entry: Down state relates to unavailability of the item.

Note 2 to entry: The adjectives “down” or “unavailable” designate an item in a down state.

192-02-21

down time
time interval for which the item is in a down state

TIME									
up time (192-02-02)					down time (192-02-21)				
enabled time (192-02-17)				disabled time (192-02-19)	enabled time (192-02-17)		disabled time (192-02-19)		
operating time (192-02-05)	non-operating time (192-02-07)			operating time (192-02-05)	non-operating time (192-02-07)				
	idle time (192-02-15)	standby time (192-02-13)	externally disabled time (192-02-24)	preventive maintenance time (192-07-05)	time to restoration (192-07-06)				
					corrective maintenance time (192-07-07)	fault detection time (192-07-11)	administrative delay (192-07-12)		
				maintenance time (192-07-02) (see Figure 2)					
RT	NRT	RT	NRT	RT	NRT	RT	NRT	RT	

NOTE 1 All times mentioned in the figure are time intervals or sequences of time intervals.

NOTE 2 In the bottom row, RT signifies required time (192-02-08) and NRT – non-required time (192-02-09), although these are not normative abbreviations.

Figure 1 – Times related to operation and maintenance

Note 1 to entry: Down time excludes disabled time due to lack of external resources, but includes maintenance time.

192-02-22

accumulated down time
sum of the individual down time durations within a given time interval

192-02-23

externally disabled state, <of an item>
external disabled state, <of an item>
state of being unable to perform as required, due to absence of external resources

EXAMPLE Diesel generator being unable to operate due to lack of fuel.

192-02-24

externally disabled time

external disabled time

DEPRECATED: external loss time

time interval for which the item is in an externally disabled state

Note 1 to entry: IEC 60050-191:1990 (now withdrawn; replaced by IEC 60050-192:2015) identified "external loss time" as a synonym, which is not true in all applications.

192-02-25

degraded state, <of an item>

state of reduced ability to perform as required, but with acceptable reduced performance

Note 1 to entry: A degraded state may be the result of faults at lower indeture levels.

Note 2 to entry: The limit of acceptable reduced performance will change with the user's needs.

192-02-26

hazardous state, <of an item>

state that has the potential to cause harm to persons, significant material damage or other unacceptable consequences

192-02-27

useful life, <of an item>

time interval, from first use until user requirements are no longer met, due to economics of operation and maintenance, or obsolescence

Note 1 to entry: In this context, "first use" excludes testing activities prior to hand-over of the item to the end-user.

192-02-28

early life failure period

infant mortality period

time interval of early life during which the instantaneous failure intensity of a repairable item, or the instantaneous failure rate of a non-repairable item, decreases significantly with time

Note 1 to entry: What is considered "significantly" will depend upon the application.

192-02-29

constant failure intensity period

time interval, in the life of a repairable item, during which its failure intensity is considered to be constant

Note 1 to entry: See constant failure rate period (192-02-30) for non-repairable items.

192-02-30

constant failure rate period

time interval, in the life of a non-repairable item, during which its failure rate is considered to be constant

Note 1 to entry: See constant failure intensity period (192-02-29) for repairable items.

192-02-31**wear-out failure period**

time interval in the life of an item for which the instantaneous failure intensity of a repairable item, or the instantaneous failure rate of a non-repairable item, increases significantly with time

Note 1 to entry: What is considered “significantly” will depend upon the application.

SECTION 192-03 – RELIABILITY RELATED CONCEPTS: FAILURES

192-03-01**failure**, <of an item>

loss of ability to perform as required

Note 1 to entry: A failure of an item is an event that results in a fault of that item: see fault (192-04-01).

Note 2 to entry: Qualifiers, such as catastrophic, critical, major, minor, marginal and insignificant, may be used to categorize failures according to the severity of consequences, the choice and definitions of severity criteria depending upon the field of application.

Note 3 to entry: Qualifiers, such as misuse, mishandling and weakness, may be used to categorize failures according to the cause of failure.

192-03-02**error**

discrepancy between a computed, observed or measured value or condition, and the true, specified or theoretically correct value or condition

Note 1 to entry: An error within a system may be caused by failure of one or more of its components, or by the activation of a systematic fault.

Note 2 to entry: See also human error (192-03-14).

192-03-03**failure criterion**

pre-defined condition for acceptance as conclusive evidence of failure

EXAMPLE A defined limiting state of wear, crack propagation, performance degradation, leakage, etc. beyond which it is deemed to be unsafe or uneconomic to continue operation.

Note 1 to entry: In a post-failure scenario, the conclusive evidence may be regarded as proof.

192-03-04**complete failure**

failure characterized by the loss of all required functions

192-03-05**partial failure**

failure characterized by the loss of some, but not all, required functions

Note 1 to entry: Partial failure may lead to a degraded state (192-02-25).

192-03-06

primary failure

failure not caused either directly or indirectly by a failure or a fault of another item

192-03-07

secondary failure

failure caused by a failure or a fault of another item

192-03-08

failure effect

consequence of a failure, within or beyond the boundary of the failed item

Note 1 to entry: For some analyses it may be necessary to consider individual failure modes and their effects.

192-03-09

criticality, <of a fault or failure>

severity of effect with respect to specified evaluation criteria

Note 1 to entry: The criticality evaluation criteria normally include: the effects of the fault or failure: on the item itself; on the system of which it is a part; and on items beyond the system boundary.

Note 2 to entry: For criticality analysis, see failure modes, effects and criticality analysis (192-11-06).

192-03-10

systematic failure

failure that consistently occurs under particular conditions of handling, storage or use

Note 1 to entry: A systematic failure can be reproduced by deliberately applying the same conditions, although not all reproducible failures are systematic.

Note 2 to entry: The cause of a systematic failure originates in the specification, design, manufacture, installation, operation or maintenance of the item.

192-03-11

failure cause

set of circumstances that leads to failure

Note 1 to entry: A failure cause may originate during specification, design, manufacture, installation, operation or maintenance of an item.

192-03-12

failure mechanism

process that leads to failure

Note 1 to entry: The process may be physical, chemical, logical, or a combination thereof.

192-03-13

failure sequence

chain of events, from the initiating event, through subsequent events, leading to failure

192-03-14**human error**

discrepancy between the human action taken or omitted, and that intended or required

EXAMPLE Performing an incorrect action; omitting a required action; miscalculation; misreading a value.

192-03-15**wear-out failure**

failure due to cumulative deterioration caused by the stresses imposed in use

Note 1 to entry: The probability of occurrence of a wear-out failure typically increases with the accumulated operating time, number of operations, and/or stress applications.

Note 2 to entry: In some instances, it may be difficult to distinguish between wear-out and ageing phenomena.

192-03-16**ageing failure**

failure whose probability of occurrence increases with the passage of calendar time due to cumulative deterioration

Note 1 to entry: Ageing is a physical or chemical phenomenon that involves changes in characteristics of the material with time, in some circumstances related to interaction with its environment.

Note 2 to entry: In some instances, it may be difficult to distinguish between wear-out and ageing phenomena.

192-03-17**failure mode**

DEPRECATED: fault mode
manner in which failure occurs

Note 1 to entry: A failure mode may be defined by the function lost or other state transition that occurred.

192-03-18**common cause failures, pl**

failures of multiple items, which would otherwise be considered independent of one another, resulting from a single cause

Note 1 to entry: Common cause failures can also be common mode failures (192-03-19).

Note 2 to entry: The potential for common cause failures reduces the effectiveness of system redundancy.

192-03-19**common mode failures, <within a system> pl**

failures of different items characterized by the same failure mode

Note 1 to entry: Common mode failures may have different causes.

Note 2 to entry: Common mode failures can also be common cause failures (192-03-18).