

JIS

JAPANESE INDUSTRIAL STANDARD

**Glossary of Terms
Used in Reliability**

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Glossary of Terms Used in Reliability

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1. Scope

This Japanese Industrial Standard specifies in principal terms used in reliability.

2. Classification

Terms are classified into the following categories:

- (1) General, Common use (G)
- (2) Reliability (R)
- (3) Failure (F)
- (4) Maintainability (M)
- (5) Availability (A)
- (6) Design (D)
- (7) Test, Inspection (T)
- (8) Time (H)
- (9) Administration (C)
- (10) Distribution (S)

3. Terms, Roman Reading and Meaning

Terms, roman reading and meaning are as follows:

And English equivalents are given for reference.

Remark: In case two or more terms are given, the priority of application shall be given in this order.

Applicable Standard:

JIS C 5003-General Test Procedure of Failure Rate for Electronic Components

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(1) General, Common Use

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
G 1	AITEMU	Either a general term or individual one including systems, subsystems, equipments, devices, components, parts, elements, etc. which are the object of responsibility consideration. Remark: These terms are used suitably in a hierarchic meaning for denoting items from upper level (systems) to lower level (parts).	item
G 2	SHISUTEMU	A composite of a series of items (hardware, software and human elements) which are selected and aligned so as to operate relating with one another in order to achieve a given mission. Remark: "KEI" is used suitably as a corresponding Japanese term.	system
G 3	NINMU	A definite task which the system shall achieve.	mission
G 4	INTAFEISU	A mutual relationship in functional and/or physical interaction when align items.	interface
G 5	KANKYŌ	The surrounding conditions in which the items exist.	environment

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
G 6	SUTORESUSU	The factors of motive forces which cause defects, failures, destruction, etc. of the item, such as temperature, voltage and mechanical stress. Remark: Mechanical stress is the reactional force produced inside a structure body opposing an applied external force and magnitude of this force is expressed per unit area. Generally, destruction occurs at the point where this stress exceeds the strength of material.	stress
G 7	KETTEN	Abnormal condition or point (out of the specified value, etc.) existing in the item, which becomes immediate cause of failure.	defect, fault
G 8	DEBAGINGU	A process of shakedown operation of each item which is performed prior to placing it in use or at earlier period of operation in order to detect, remove and remedy inadequacies of latent defects, whereby earlier failures are reduced.	debugging
G 9	BANIN	To operate an item for definite time under stress prior to the actual use in order to improve fitness of the items and to stabilize its characteristics. It is also used for screening. Remark: It is also called "trial to fit".	burn-in

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No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
G 10	SUKURĪNINGU	A process for inspecting items to remove those that include latent defects through tests conforming to that failure mechanism. Remark: As a rule, one hundred percent inspection system by non-destructive means is used for this purpose.	screening
G 11	ANZENSEI	Condition not giving loss or damage to human life or to material. Remark: Reliability deals with functional failures of the item in order to accomplish the specified mission, while safety deals with dangerous conditions which may cause loss or damage to human life and material.	safety
G 12	NINGENKOGAKU	An engineering to determine the design method, work procedures, work environment, etc. for an item in accordance with human capability and its limitation.	human engineering, ergonomics
G 13	NINGENKIKAIKEI	A system which contains human being as a constituting element.	man-machine system
G 14	SHISUTEMUYUKODO	A measure to express goodness that a system can expect to accomplish a given mission. It is expressed by functions of reliability, availability, capability, etc.	system effectiveness

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
G 15	RAIFUSAIKURU	All phases and periods for an item between from its development to its abolishment.	Life cycle
G 16	KOSUTOYŪKŌDO	Adividend obtained from that system effectiveness is divided by the total cost required for a life cycle of the system.	cost effectiveness
G 17	KANSOKUCHI	The characteristic value obtained from observation relating to a sample subjected to stated stress condition for a stated time period. (see R 2) Remark: This corresponds to a point estimation value in statistical estimation.	observed value
G 18	SUITEICHI	A limiting value of the confidence interval with a stated confidence level based on observed data relating to a population. (see R 2) Remark: This corresponds to an interval estimation value in statistical estimation.	assessed value
G 19	SŌNYŪCHI	A value obtained without for the given period or stress conditions based on the observed value or the assessed value. (see R 2) Remark: It includes the interpolated and extrapolated values.	extrapolated value

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No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
G 20	YOSOKUCHI	A characteristic value of the upper level item (e.g. equipment, system, etc.) predicted based on those of the lower level items (e.g. parts). (see R 2)	predicted value
G 21	SHŪRIKKEI	A system which can be restored its mal-functions by corrective maintenance after an item is put in operation. Remarks 1. A system which is intended for successive use by maintenance is called a repairable item. 2. An item neither can be restored its normal function by maintenance nor to maintain when it fails, is called a Non-repairable item. Specifically, an item which is intended to use only for one mission is called a One-shot Item.	repairable item, repairable system
G 22	REKKA	A gradual impairment of the characteristics and capability of an item.	degradation, deterioration
G 23	JUMYŌ	A time period in which an item is used from the setting about operation to the abolishment thereof. Remark: The period is expressed in time, cycles, operation distance, etc.	life

(2) Reliability

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
R 1	SHINRAISEI	The ability of an item to perform a required function under stated conditions for a stated period of time.	reliability
R 2	SHINRAISEI-TOKUSEICHI	A measure to express the reliability of an item quantitatively. Remark: General term for reliability, maintainability, failure rate, mean life, MTBF, MTTF, MTTR, etc.	reliability characteristics, reliability parameter
R 3	SHINRAISEI-KŌGAKU	Applied science and technology for the purpose of giving reliability to an item.	reliability engineering
R 4	SHINRAIDO	The probability of an item to perform a required function under stated conditions for a stated period of time. (see S 3 and S 7)	reliability
R 5	SHINRAIDO-HIKAKUSHISŪ	The product of the number of principal parts and MTBF of an equipment under specified environmental conditions. Remarks 1. A reciprocal of reliability index is called the <u>Failure Rate Index</u> . 2. This index is used to make a comparison of reliabilities based upon the complexities (e.g. number of principal parts of equipments) of the items and severities of the environment where they exist.	reliability index

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No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
R 6	KOYŪSHINRAIDO	Reliability implemented into an item through such processes as design, manufacture, testing, etc. Quantitatively, it is a target value or predicted value of reliability given in the design stage, or the reliability characteristics obtained from the result of reliability test.	inherent reliability
R 7	UNYŌSHINRAIDO	The reliability of an item under operation or use condition. Remark: Let R_o be the operational reliability and R_i be the inherent reliability, we obtain $R_o = R_i \times k$ where k is a parameter which depends on the conditions of usage and/or maintenance, normally $k < 1$.	operational reliability

(3) Failure

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
F 1	KOSHŌ	The termination of the ability of an item to perform a required function.	failure
F 2	KOSHŌMŌDO	Classification of the effect by which a failure is observed, for example, open, short, break, wear-out, deterioration of characteristics, etc.	failure mode
F 3	KOSHŌMEKANIZUMU	The physical, chemical, mechanical, electrical, human or other process which results in failure of an item.	failure mechanism

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
F 4	SHOKIKOSHŌ	Failure attributable to the defects of design and manufacture, and/or to the non-conformity with applied environment, which occurs at earlier period after the item is set about operation. (see H 1)	initial failure, early failure
F 5	GŪHATSUKOSHŌ	Failure which occurs at random inbetween after the early failure period until the wear-out failure period. (see H 2)	random failure, chance failure
F 6	MAMŌKOSHŌ	Failure whose failure rate increases with the passage of time and which occurs as a result of fatigue, wear-out, time-aged deterioration, etc. (see H 3)	wear-out failure
F 7	ICHIJIKOSHŌ	Failure of an item, not caused either directly or indirectly by the failure of another item.	primary failure
F 8	NIJIKOSHŌ	Failure of an item, caused either directly or indirectly by the failure of another item. It is also called "Influenced Failure".	secondary failure
F 9	TANITSUKOSHŌ	Failure of an item caused by a single cause of failure.	single failure
F 10	FUKUGŌKOSHŌ	Failure of an item caused by the combination of two or more causes.	combined failure

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No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
F 11	KOYÜKEKKAN-KOSHÔ	Failure attributable to weakness inherent in the item itself when subjected to stresses within the stated capabilities of the item.	inherent weakness failure
F 12	CHÔKASUTORESUKOSHÔ	Failure attributable to the application of stresses beyond the stated capabilities of the item.	over-stress failure
F 13	GOYÔKOSHÔ	Failure attributable to improper application of component and material in design stage or to errors in planning and execution on testing, operation maintenance, etc.	misuse failure
F 14	BUBUNKOSHÔ	Failure which is partial and does not cause complete lack of the required function.	partial failure
F 15	KANZENKOSHÔ	Failure by which the required function of an item is completely lost.	complete failure
F 16	TOPPATSUKOSHÔ	Failure that occurs suddenly and could not be anticipated by prior examination or monitoring. Remark: That failure which is both sudden and complete may be called "catastrophic failure".	sudden failure

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
F 17	REKKAKOSHŌ	Failure that characteristic(s) of an item gradually deteriorate and could be anticipated by prior examination or monitoring. Remark: Failure which is both gradual and partial is sometimes called "degradation failure".	gradual failure
F 18	KANKETSUKOSHŌ	Failure which an item malfunctioned for a limited period of time, recovers its ability to perform the required function without being subjected to any external corrective action, and that the above phenomenon is repeated.	intermittent failure
F 19	GAITŌKOSHŌ	Failure which should be counted for evaluation of the test results or calculation of the reliability characteristics. For these purposes, the criteria shall be clarified beforehand.	relevant failure
F 20	HIGAITŌKOSHŌ	Failure which should be excluded for evaluation of the test result or calculation of the reliability characteristics. The criteria for exclusion shall be clarified beforehand.	non-relevant failure
F 21	CHIMEIKOSHŌ	Failure which possibly gives injury to the human body or critical damage to material. Remark: It is a classification in view of not only the failure condition (lack of a required function), but also the safety condition.	critical failure

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No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
F 22	JUKOSHŌ	Failure which possibly reduces a function of the upper level item to perform the stated function.	major failure
F 23	KEIKOSHŌ	Failure of minor degree whose effect does not cause a major failure.	minor failure
F 24	KOSHŌKAISEKI	Systematic survey and research on an item to determine the corrective action for the failure through investigation on the failure mechanisms, frequency of occurrence, and the effect caused by the failure in relation to actual and latent failures of an item.	failure analysis
F 25	KOSHŌ HANTEI-KIJUN	The specified limits of function of an item as a standard by which failure of the item is defined.	failure criterion

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
F 26	KOSHÔRITSU	The frequency of failure occurrence of an item per successive unit period where the item has functioned normally until a certain point of time. Remarks 1. "Failure rate" usually means both an instantaneous failure rate (see S 9) and a mean failure rate. When the term "failure rate" is simply quoted, however, it means an instantaneous failure rate. Actually it is obtained as a mean failure rate by the following formula: $\text{Mean failure rate} = \frac{\text{The total number of failures observed during the total operating period}}{\text{The total operating hours}}$ 2. As a unit of failure rate, $\%/10^3\text{h}$, FIT=$10^{-9}/\text{h}$, etc. are used.	failure rate
F 27	KOSHÔRITSU-SUIJUN	An expedient classification of failure rate that is distinguished into some levels denoted by letter symbol. For example, failure rate of 1 % per 10^3h is termed Level M. (see JIS C 5003)	failure rate level
F 28	KIJUNKOSHÔ-RITSU	Failure rate observed under a standard environmental condition. (e.g. on ground, indoor, within laboratory, etc.)	generic failure rate, basic failure rate

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(4) Maintainability

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
M 1	HOZEN	All those dispositions and activities as necessary to retain an item in usable and operational condition or to restore it without failures, defects, etc. Remarks 1. Managerial classification of maintenance is as follows: <pre> graph TD A[Maintenance] --> B[Preventive maintenance] A --> C[Corrective maintenance] B --> D[Scheduled maintenance] B --> E[Monitored maintenance] D --> F[Periodic maintenance] D --> G[Age-based maintenance] C --> H[Urgent maintenance] C --> I[Normal corrective maintenance] </pre> 2. "Hozen (in Japanese)" is often called as "Seibi".	maintenance

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
M 2	YOBŌHOZEN	All those actions as performed on schedule to prevent previously failures of an item that is in service and to retain an item in usable condition. Remark: Preventive maintenance includes the following: (1) Taking place of test and inspection to detect an indication of failure or defect. (2) Taking place of lubrication, cleaning, regulation, etc. (3) Repair work to replace the defective item. (4) Work to interchange the periodical replacement items.	preventive maintenance
M 3	JIGOHOZEN	All actions performed as a result of failure to restore an item in operational condition. Remark: Measures performed against failures of an item to which no preventive maintenance is performed according to management rules is usually termed a corrective maintenance. And measures performed against failures of an item to which preventive maintenance is performed, is termed an urgent maintenance, and is discriminated from the normal corrective maintenance.	corrective maintenance

No.	Term in Romanized Japanese	Definition	(Reference) English equivalent
M 4	JIKANKEIKAKU-HOZEN	A general term given to the preventive maintenance which is performed according to a prearranged time schedule.	scheduled maintenance
M 5	TEIKIHOZEN	Preventive maintenance performed at prearranged time intervals.	periodic maintenance
M 6	KELJIHOZEN	Preventive maintenance performed when the operational time of an item reaches the planned cumulative operational time.	age-based maintenance
M 7	JŌTAIKANSHI	A monitoring on performance characteristics and its tendency of an item performed at a certain time in order to confirm whether an item is in operation or not, to confirm the functioning state in service, to detect a deterioration tendency, to confirm the location where failure and defect occurs, to make records in the course of failure, and to trace them. Monitoring is performed continuously, intermittently or periodically either by means of inspecting, testing, measuring, warning, etc. or by devices.	condition monitoring
M 8	JŌTAIKANSHI-HOZEN	Preventive maintenance performed according to condition monitoring.	monitored maintenance, condition-based maintenance