NF EN ISO 12100 (décembre 2010)

Tirage (2010-12-01)

3 - **Terms and definitions**

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

3.1 - machinery machine

assembly, fitted with or intended to be fitted with a drive system consisting of linked parts or components, at least one of which moves, and which are joined together for a specific application

The term “machinery” also covers an assembly of machines which, in order to achieve the same end, are arranged and controlled so that they function as an integral whole.

Annex A provides a general schematic representation of a machine.

3.2 - reliability

ability of a machine or its components or equipment to perform a required function under specified conditions and for a given period of time without failing

3.3 - maintainability

ability of a machine to be maintained in a state which enables it to fulfil its function under conditions of intended use, or to be restored to such a state, with the necessary actions (maintenance) being carried out according to specified practices and using specified means

3.4 - usability

ability of a machine to be easily used owing to, among others, properties or characteristics that enable its function(s) to be easily understood

3.5 - harm

physical injury or damage to health

3.6 - hazard

potential source of harm

The term “hazard” can be qualified in order to define its origin (for example, mechanical hazard, electrical hazard) or the nature of the potential harm (for example, electric shock hazard, cutting hazard, toxic hazard, fire hazard).

The hazard envisaged by this definition either

- is permanently present during the intended use of the machine (for example, motion of hazardous moving elements, electric arc during a welding phase, unhealthy posture, noise emission, high temperature), or

- can appear unexpectedly (for example, explosion, crushing hazard as a consequence of an unintended/unexpected start-up, ejection as a consequence of a breakage, fall as a consequence of acceleration/deceleration).

The French term "*phénomène dangereux*" should not be confused with the term "*risque*", which was sometimes used instead in the past.

3.7 - relevant hazard

hazard which is identified as being present at, or associated with, the machine

A relevant hazard is identified as the result of one step of the process described in Clause 5.

This term is included as basic terminology for type-B and type-C standards.

3.8 - significant hazard

hazard which has been identified as relevant and which requires specific action by the designer to eliminate or to reduce the risk according to the risk assessment

NOTE : This term is included as basic terminology for type-B and type-C standards.

3.9 - hazardous event

event that can cause harm

NOTE : A hazardous event can occur over a short period of time or over an extended period of time.

3.10 - hazardous situation

circumstance in which a person is exposed to at least one hazard

NOTE : The exposure can result in harm immediately or over a period of time.

3.11 - hazard zone

danger zone any space within and/or around machinery in which a person can be exposed to a hazard

3.12 - risk

combination of the probability of occurrence of harm and the severity of that harm

3.13 - residual risk

risk remaining after protective measures have been implemented

This International Standard distinguishes

- the residual risk after protective measures have been implemented by the designer,
- the residual risk remaining after all protective measures have been implemented.

See also Figure 2.

3.14 - risk estimation

defining likely severity of harm and probability of its occurrence

3.15 - risk analysis

combination of the specification of the limits of the machine, hazard identification and risk estimation

3.16 - risk evaluation

judgment, on the basis of risk analysis, of whether the risk reduction objectives have been achieved

3.17 - risk assessment

overall process comprising a risk analysis and a risk evaluation

3.18 - adequate risk reduction

risk reduction that is at least in accordance with legal requirements, taking into consideration the current state of the art

NOTE : Criteria for determining when adequate risk reduction is achieved are given in 5.6.2.

3.19 - protective measure

measure intended to achieve risk reduction, implemented

- by the designer (inherently safe design, safeguarding and complementary protective measures, information for use) and/or
- by the user (organization: safe working procedures, supervision, permit-to-work systems; provision and use of additional safeguards; use of personal protective equipment; training)

NOTE : See Figure 2.

3.20 - inherently safe design measure

protective measure which either eliminates hazards or reduces the risks associated with hazards by changing the design or operating characteristics of the machine without the use of guards or protective devices

NOTE : See 6.2.

3.21 - safeguarding

protective measure using safeguards to protect persons from the hazards which cannot reasonably be eliminated or risks which cannot be sufficiently reduced by inherently safe design measures

NOTE : See 6.3.

3.22 - information for use

protective measure consisting of communication links (for example, text, words, signs, signals, symbols, diagrams) used separately or in combination, to convey information to the user

NOTE : See 6.4.

3.23 - intended use

use of a machine in accordance with the information for use provided in the instructions

3.24 - reasonably foreseeable misuse

use of a machine in a way not intended by the designer, but which can result from readily predictable human behaviour

3.25 - task

specific activity performed by one or more persons on, or in the vicinity of, the machine during its life cycle

3.26 - safeguard

guard or protective device

3.27 - guard

physical barrier, designed as part of the machine to provide protection

A guard may act either

- alone, in which case it is only effective when “closed” (for a movable guard) or “securely held in place” (for a fixed guard), or
- in conjunction with an interlocking device with or without guard locking, in which case protection is ensured whatever the position of the guard.

Depending on its construction, a guard may be described as, for example, casing, shield, cover, screen, door, enclosing guard.

The terms for types of guards are defined in 3.27.1 to 3.27.6. See also 6.3.3.2 and ISO 14120 for types of guards and their requirements.

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guard affixed in such a manner (for example, by screws, nuts, welding) that it can only be opened or removed by the use of tools or by destruction of the affixing means
guard which can be opened without the use of tools
fixed or movable guard which is adjustable as a whole or which incorporates adjustable part(s)
guard associated with an interlocking device so that, together with the control system of the machine, the following functions are performed:

- the hazardous machine functions “covered” by the guard cannot operate until the guard is closed,
- if the guard is opened while hazardous machine functions are operating, a stop command is given, and
- when the guard is closed, the hazardous machine functions “covered” by the guard can operate (the closure of the guard does not by itself start the hazardous machine functions)

NOTE : ISO 14119 gives detailed provisions.

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guard associated with an interlocking device and a guard locking device so that, together with the control system of the machine, the following functions are performed:

- the hazardous machine functions “covered” by the guard cannot operate until the guard is closed and locked,
- the guard remains closed and locked until the risk due to the hazardous machine functions “covered” by the guard has disappeared, and
- when the guard is closed and locked, the hazardous machine functions “covered” by the guard can operate (the closure and locking of the guard do not by themselves start the hazardous machine functions)

NOTE : ISO 14119 gives detailed provisions.

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control guard special form of interlocking guard which, once it has reached its closed position, gives a command to initiate the hazardous machine function(s) without the use of a separate start control

NOTE : See 6.3.3.2.5 for detailed provisions on the conditions of use.

3.28 - protective device

safeguard other than a guard

NOTE : Examples of types of protective devices are 3.28.1 to 3.28.9.

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interlock mechanical, electrical or other type of device, the purpose of which is to prevent the operation of hazardous machine functions under specified conditions (generally as long as a guard is not closed)
additional manually operated device used in conjunction with a start control and which, when continuously actuated, allows a machine to function
control device which initiates and maintains machine functions only as long as the manual control (actuator) is actuated
control device which requires at least simultaneous actuation by both hands in order to initiate and to maintain hazardous machine functions, thus providing a protective measure only for the person who actuates it

NOTE : ISO 13851 gives detailed provisions.

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equipment for detecting persons or parts of persons which generates an appropriate signal to the control system to reduce risk to the persons detected

NOTE : The signal can be generated when a person or part of a person goes beyond a predetermined limit — for example, enters a hazard zone — (tripping) or when a person is detected in a predetermined zone (presence sensing), or in both cases.

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device whose sensing function is performed by optoelectronic emitting and receiving elements detecting the interruption of optical radiation, generated within the device, by an opaque object present in the specified detection zone

NOTE : IEC 61496 gives detailed provisions.

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device which introduces into a mechanism a mechanical obstacle (for example, wedge, spindle, strut, scotch) which, by virtue of its own strength, can prevent any hazardous movement
device which prevents a machine or hazardous machine condition(s) from exceeding a designed limit (space limit, pressure limit, load moment limit, etc.)
control device, a single actuation of which, together with the control system of the machine, permits only a limited amount of travel of a machine element

3.29 - impeding device

any physical obstacle (low barrier, rail, etc.) which, without totally preventing access to a hazard zone, reduces the probability of access to this zone by offering an obstruction to free access

3.30 - safety function

function of a machine whose failure can result in an immediate increase of the risk(s)

3.31 - unexpected start-up

unintended start-up any start-up which, because of its unexpected nature, generates a risk to persons

This can be caused by, for example:

- a start command which is the result of a failure in, or an external influence on, the control system;
- a start command generated by inopportune action on a start control or other parts of the machine such as a sensor or a power control element;
- restoration of the power supply after an interruption;
- external/internal influences (gravity, wind, self-ignition in internal combustion engines, etc.) on parts of the machine.

Machine start-up during normal sequence of an automatic cycle is not *unintended*, but can be considered as being *unexpected* from the point of view of the operator. Prevention of accidents in this case involves the use of safeguarding measures (see 6.3).

Adapted from ISO 14118:2000, definition 3.2.

3.32 - failure to danger

any malfunction in the machinery, or in its power supply, that increases the risk

3.33 - fault

state of an item characterized by inability to perform a required function, excluding the inability during preventive maintenance or other planned actions, or due to lack of external resources[IEV 191-05-01]

A fault is often the result of a failure of the item itself, but can exist without prior failure.

In the field of machinery, the English term “fault” is commonly used in accordance with the definition in IEV 191-05-01, whereas the French term “*défaut*” and the German term “*Fehler*” are used rather than the terms “*panne*” and “*Fehlzustand*” that appear in the IEV with this definition.

In practice, the terms “fault” and “failure” are often used synonymously.

3.34 - failure

termination of the ability of an item to perform a required function

After failure, the item has a fault.

“Failure” is an event, as distinguished from “fault”, which is a state.

The concept as defined does not apply to items consisting of software only.

[IEV 191-04-01]

3.35 - common cause failures

failures of different items, resulting from a single event, where these failures are not consequences of each other

NOTE : Common cause failures should not be confused with common mode failures.

[IEV 191-04-23]

3.36 - common mode failures

failures of items characterized by the same fault mode

NOTE : Common mode failures should not be confused with common cause failures, as the common mode failures can result from different causes.

[IEV 191-04-24]

3.37 - malfunction

failure of a machine to perform an intended function

NOTE : See 5.4, item b) 2) for examples.

3.38 - emergency situation

hazardous situation needing to be urgently ended or averted

NOTE : An emergency situation can arise

- during normal operation of the machine (for example, due to human interaction, or as a result of external influences), or
- as a consequence of a malfunction or failure of any part of the machine.

3.39 - emergency operation

all actions and functions intended to end or avert an emergency situation

3.40 - emergency stop emergency stop function

function which is intended to

- avert arising or reduce existing hazards to persons, damage to machinery or to work in progress, and
- be initiated by a single human action

NOTE : ISO 13850 gives detailed provisions.

3.41 - emission value

numerical value quantifying an emission generated by a machine (for example, noise, vibration, hazardous substances, radiation)

Emission values are part of the information on the properties of a machine and are used as a basis for risk assessment.

The term “emission value” ought not to be confused with “exposure value”, which quantifies the exposure of persons to emissions when the machine is in use. Exposure values can be estimated using the emission values.

Emission values are preferably measured and their associated uncertainties determined by means of standardized methods (for example, to allow comparison between similar machines).

3.42 - comparative emission data

set of emission values of similar machines collected for the purpose of comparison

NOTE : For noise comparison, see ISO 11689.
