

Risk evaluation

With the risk evaluation, a decision is taken as to whether any risk reduction measures are required or whether the risk may be considered to have been adequately reduced.

Adequate risk reduction is achieved if:

- all operating conditions and all intervention procedures have been considered,
- the hazards have been eliminated or risks reduced to the lowest practicable level,
- any new hazards introduced by the protective measures have been properly addressed,
- users are sufficiently informed and warned about the residual risks,
- protective measures are compatible with one another,
- sufficient consideration has been given to the consequences that can arise from the use in a nonprofessional/ non-industrial context of a machine designed for professional/industrial use, and
- the protective measures do not adversely affect the operator's working conditions or the usability of the machine.

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

Information on the state of the art can be found in standards, the titles of which are listed in the Official Journal of the European Union.

If the specifications of a listed machine safety standard (type-C standard) are applied on the basis of a risk assessment, it may be assumed that the essential health and safety requirements of the Machinery Directive 2006/42/EC, which are covered by the standard, are fulfilled.

If there is no type-C standard for the machinery, the state of the art may be taken into account with the comparison of risks.

Comparison of risks:

The risks associated with a machine can be compared, subject to certain criteria, with those of similar machines that correspond to a relevant type-C standard or standards.

Documentation

The documentation shall demonstrate the assumptions, the procedure that has been followed and the results that have been achieved.

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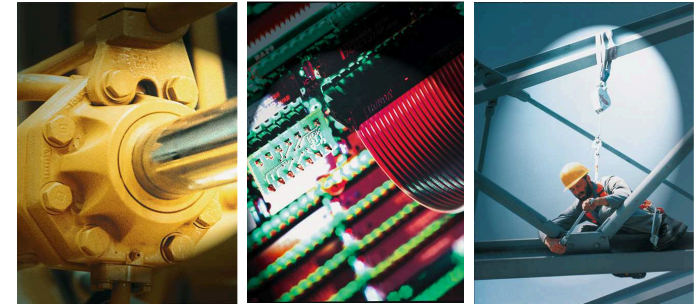
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Safety of machinery - most important points for risk assessment

Overview of EN ISO 12100

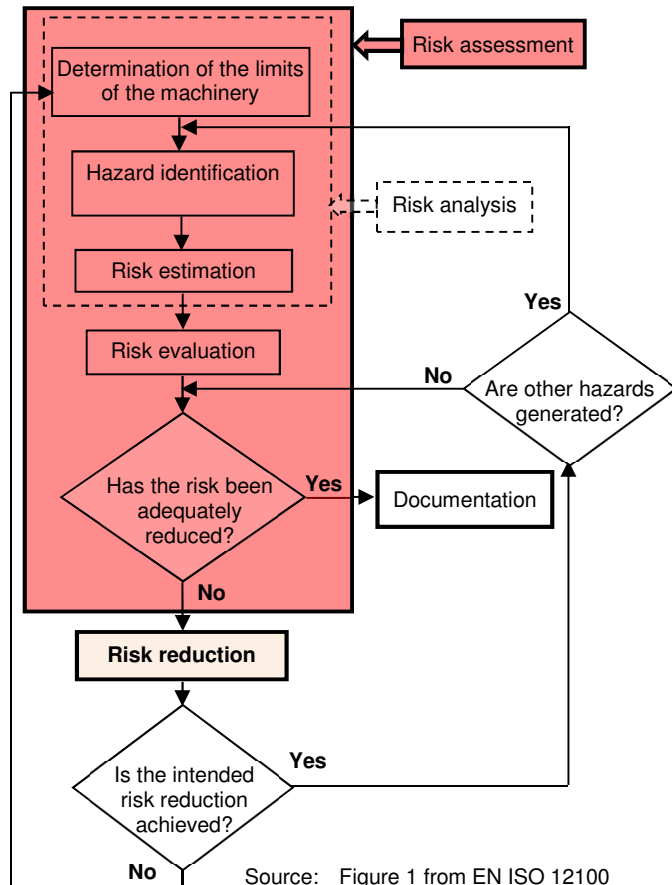
Directive 2006/42 / EC (Machinery Directive) requires that the manufacturer of a machine performs a risk assessment and risk reduction.

The Standard EN ISO 12100 specifies terminology, principles and a methodology for achieving safety in the design of machinery.

It specifies principles of risk assessment and risk reduction, and Procedures are described for identifying hazards and estimating and evaluating risks during relevant phases of the machine life cycle, and for the elimination of hazards or the provision of sufficient risk reduction.

This document provides an overview of the main aspects of risk assessment contained in EN ISO 12100. It is not a substitute for reading and applying the standard. This document provides an overview of the main aspects contained of risk reduction in EN ISO 12100. It is not a substitute for reading and applying the standard.

Risk assessment is a series of logical steps to enable, in a systematic way, the analysis and evaluation of the risks associated with machinery. Risk assessment is followed, whenever necessary, by risk reduction, and usually by repeating the process.



Information for risk assessment

- user specifications
- anticipated machinery specifications (description of the various phases of the whole life cycle, design drawings, energy sources)
- documentation on previous designs of similar machinery
- information for use of the machinery
- regulations, standards, technical specifications, safety data sheets

Determination of the limits of the machinery

The limits of the machinery in all phases of the life cycle must be determined, taking the following into account:

- characteristics and performances of the machine
- at the machine process related persons
- environment of the machine
- associated with the machine related Products

use limits in all life phases and operating modes

- the intended use
- foreseeable misuse

space limits

- the range of movement
- human interaction such as the operator-machine interface
- the machine-power supply interface

time limits

- life limit of the machinery and of some of its components
- recommended service intervals

other limits

- properties of the material(s) to be processed
- housekeeping — the level of cleanliness required
- environmental conditions

Hazard identification

Identification of the machinery situations by determining which operations are to be performed by the machinery and which by persons.

In doing so it is necessary to take into account the following:

- Machine, material to be processed, environment
- Human interaction during the whole life cycle of the machine
- Possible states of the machine
- Unintended behaviour of the operator or reasonably foreseeable misuse of the machine

In the machinery situations found, all hazards, hazardous situations and/or hazardous events must be systematically identified.

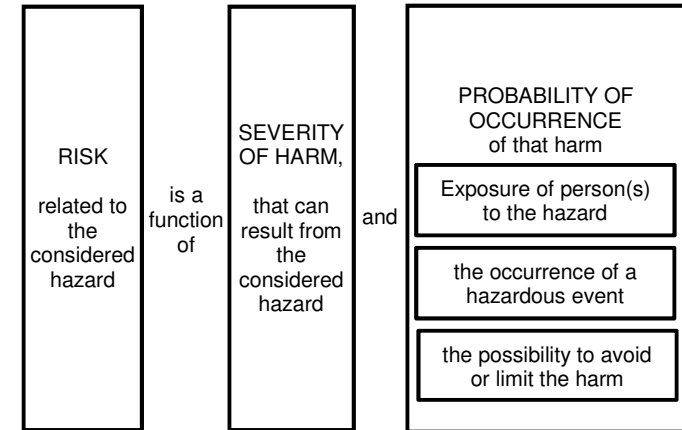
Risk estimation

Risk estimation of each hazardous situation by determining the elements of risk:

- severity of harm (injury or damage to health)
- the probability of harm from:
 - 1) the exposure of person(s) to the hazard,
 - 2) the occurrence of a hazardous event, and
 - 3) the technical and human possibilities to avoid or limit the harm

consider:

- Persons exposed
- Type, frequency and duration of exposure to the hazard
- Relationship between exposure to the hazard and effects
- Human factors
- Suitability of protective measures
- Possibility of defeating or circumventing protective measures
- Ability to maintain protective measures
- Information for use



Source: Figure 3 from EN ISO 12100