

- Safeguarding to reduce emissions

If the measures for the reduction of emissions at source are not adequate, the machine shall be provided with additional protective measures

- Noise
- Vibration
- Hazardous substances
- Radiation

- Complementary protective measures

Protective measures which are neither inherently safe design measures, nor safeguarding, nor information for use, could have to be implemented as required by the intended use and the reasonably foreseeable misuse of the machine.

- Components and elements to achieve emergency stop function
- Measures for the escape and rescue of trapped persons
- Measures for isolation and energy dissipation
- Provisions for easy and safe handling of machines and their heavy component parts
- Measures for safe access to machinery

3. Information for use:

Information shall be provided to the user about the intended use of the machine, taking into account, notably, all its operating modes. The information shall contain all directions required to ensure safe and correct use of the machine. With this in view, it shall inform and warn the user about residual risk.

Please note the following points:

- Location and nature of information for use
- Signals and warning devices
- Markings, signs (pictograms) and written warnings
- Accompanying documents (in particular — instruction handbook)
- Production of instruction handbook
- Drafting and editing information for use

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Safety of machinery - most important points for risk reduction

Overview of EN ISO 12100

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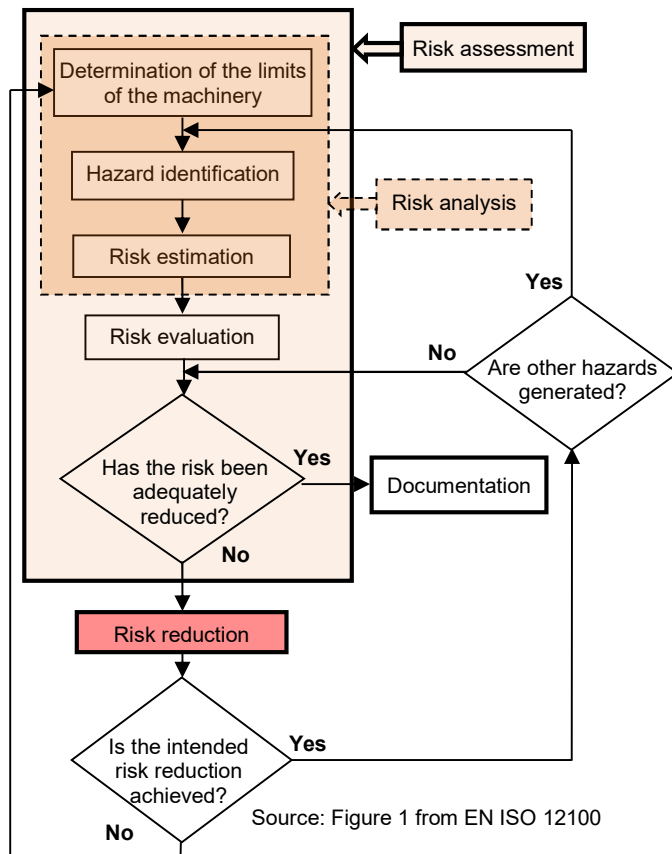
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Directive 2006/42 / EC (Machinery Directive) requires that the manufacturer of a machine performs a risk assessment and risk reduction.
The Standard EN ISO 12100 specifies terminology, principles and a methodology for achieving safety in the design 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 reduction 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.



To achieve the objective of risk reduction through protective measures to eliminate hazards or reduce the risk, the following procedure known as a "3-step procedure" must be performed in this order.

1. Inherently safe design measures

Elimination of hazards or reduction of the associated risks by a suitable choice of design features of the machine itself.

2. Safeguarding and/or complementary protective measures

Appropriately selected safeguarding and complementary protective measures should be used, to reduce risk when it is not practicable to eliminate a hazard, or reduce its associated risk sufficiently, using inherently safe design measures

3. Information for use

Where risks remain despite inherently safe design measures, safeguarding and the adoption of complementary protective measures, the residual risks shall be identified in the information for use.

1. Inherently safe design measures:

Inherently safe design measures are the first and most important step in the risk reduction process. This is because protective measures inherent to the characteristics of the machine are likely to remain effective

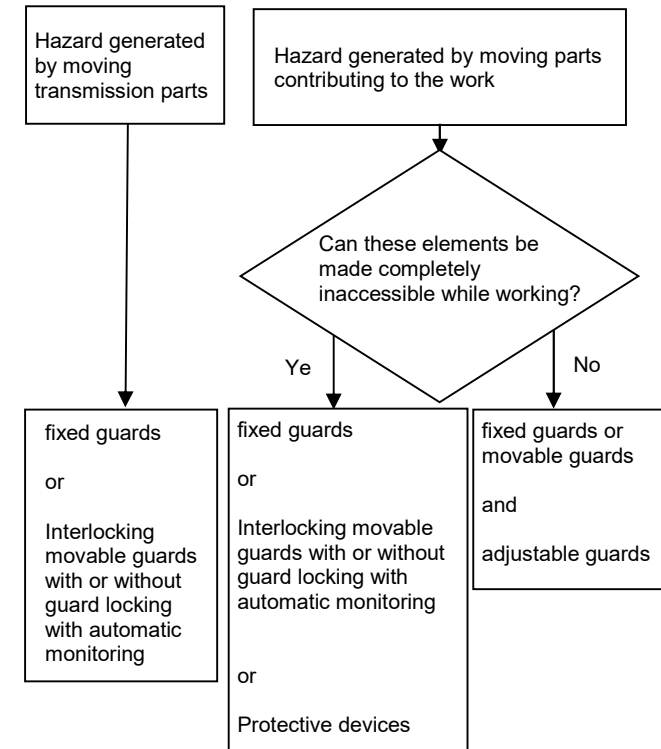
- Consideration of geometrical factors and physical aspects
- Taking into account general technical knowledge of machine design
- Choice of appropriate technology
- Applying principle of positive mechanical action
- Provisions for stability
- Provisions for maintainability
- Observing ergonomic principles
- Electrical hazards
- Pneumatic and hydraulic hazards
- Applying inherently safe design measures to control systems
- Minimizing probability of failure of safety functions
- Limiting exposure to hazards through reliability of equipment
- Limiting exposure to hazards through mechanization or automation of loading (feeding)/ unloading (removal) operations
- Limiting exposure to hazards through location of setting and maintenance points outside danger zones

2. Safeguarding and/or complementary protective measures:

To protect persons from hazards which are either inappropriately avoided or whose risks cannot be adequately limited by means of inherently safe design, guards and protective devices must be used.

- Selection and implementation of guards and protective devices

Guidelines for choosing safeguards against hazards generated by moving parts.



Source: Figure 4 from EN ISO 12100

- Requirements for design of guards and protective devices
 - Requirements for guards
 - Technical characteristics of protective devices