

ICS 13.110
CCS J 09



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 35081-2018

**Safety of machinery -- Relationship of GB/T 16855.1 to GB/T
15706**

机械安全 GB/T 16855.1与GB/T 15706的关系
(English Translation)

Issued on: May 14, 2018

Implemented on: December 1, 2018

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

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1 Scope

This standard gives the relationship between the two standards GB/T 15706 and GB/T 16855.1 for reducing the risk of injury, and focuses on The relationship between the application of the safety-related components of the control system and the process of risk assessment and risk reduction is given.

Note: The relationship between GB/T 16855.1 and GB/T 15706 given in this standard is also applicable to the relationship between GB 28526 and GB/T 15706.

2 Normative references

The following documents are essential for the application of this document. For dated references, only the dated version applies to this article pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 15706-2012 General Principles of Mechanical Safety Design Risk Assessment and Risk Reduction (ISO 12100:2010, IDT)

GB/T 16855.1 Safety-related components of machinery safety control system Part 1: General design rules (GB/T 16855.1-2008, ISO 13849-1:2006, IDT)

3 General structure of machinery safety standard system

The machinery safety standard is structured as follows.

--- Type A standard (basic safety standard) gives the basic concepts, design principles and general characteristics that can be applied to all machinery safety. standard;

--- Class B standard (general safety standard) specifies a safety feature of machinery or a class of safety devices that can be used in a wide range of applications. standard;

---C-type standard (machine product safety standard) is a standard that specifies detailed safety requirements for a specific machine or group of machines.

As shown in Figure 1, GB/T 15706 is a Class A standard that specifies the general principles of machinery safety and applies to all machinery. GB/T 16855.1 For specific characteristics, it is a typical Class B standard and applies to most machines.

4 Risk Assessment and Risk Reduction Process

GB/T 15706 is the basic standard for machinery safety. Machinery manufacturers should follow the risk assessment and risk reduction described in GB/T 15706 Process for hazard identification, risk estimation, and adequate risk reduction (acceptable risk).

Figure 2 shows the process of risk assessment and risk reduction according to GB/T 15706, which incorporates the same requirements as GB/T 16855.1 mutual relationship.

As shown in Figure 2, when performing risk assessment according to GB/T 15706, GB/T 16855.1 is related to the risk of related to risk reduction measures such as interlocking guards. At this time, the safety-related control system needs to perform safety functions, GB/T 16855.1 only applies in this case.

In the risk assessment and risk reduction process (iterative three-step method) specified in GB/T 15706, the hazards related to the relevant machinery should be identified and evaluated.

Calculate risk. As shown in Figure 2, risk estimation is usually performed before risk reduction. Pass any risk scoring system in GB/T 16856 or method to estimate the initial risk. It should be noted that the methods provided in GB/T 16855.1 are mainly used for the safety of safety-related control system execution.

Features. For example, a category or performance level has no meaning for a slip hazard or a fall hazard.

According to GB/T 15706, when selecting a control system with safety functions as a protective measure/risk reduction measure (such as a protective door interlock), the safety-related components of the control system should be designed and evaluated according to GB/T 16855.1. Not all components in the control system All perform safety functions, such as certain distance sensors, component counters or monitoring devices, only the safety-relevant components in the control system belong to the Scope of application of GB/T 16855.1. For non-safety-related components in the control system,

GB/T 16855.1 need not be applied.

5.1 Overview

For the correct application of GB/T 16855.1, basic input information should be obtained from the overall wind in the design process of a particular machine.

Risk assessment and risk reduction process. Based on these input information, an appropriate control system safety-related part can be designed according to GB/T 16855.1 pieces. Then, according to the overall risk assessment and risk reduction process in GB/T 15706, the details of the safety-related components of the control system will be The information obtained during the process of integrating the design into the machine design is considered. Figure 3 shows the relationship between them.

GB/T 16855.1 5.2 Input information of The following information entered into GB/T 16855.1 is for a specific machine, and the overall risk assessment and risk reduction are carried out according to GB/T 15706 The information obtained in the small process is also the necessary information for the correct application of GB/T 16855.1.

a) According to 5.3 in GB/T 15706-2012, the machine limitations include.

- 1) usage restrictions;
- 2) Space constraints;
- 3) time limit;
- 4) Other restrictions (eg environmental conditions).

b) According to 5.5.2 in GB/T 15706-2012, the risk associated with a specific hazardous situation depends on the following factors.

- 1) The severity of the injury.
- 2) The probability of the damage occurring, which is a function of the following parameters.
 - i) personnel are exposed to danger;
 - ii) the occurrence of a hazardous event; ii) technical and human possibilities to avoid or limit harm.

These risk elements shall take into account all risk reduction measures (intrinsic safety design, safeguards/protective measures). In the absence of any risk reduction measures (intrinsically safe design, safety guards/protective measures The risk factor is the same as the result obtained in step 1 of the iterative process in GB/T 15706.

Note 1: The occurrence of hazardous events can be caused by technical or human causes. For more instructions, see A.2.3 in GB/T 16855.1-2008.

Note 2: The occurrence of dangerous events and the technical and human possibilities for avoiding

or limiting injury can be summarized as the same as those in GB/T 16855.1-2008, Appendix A the parameter P.

When the risk assessment and risk reduction process is carried out according to GB/T 15706, if the risk factor table is used, the risk assessment tool should be The output information matches the performance level table given in GB/T 16855.1. All input information required to select the desired performance level PLr (The risk value of the considered hazardous situation) can be obtained from the overall risk assessment and risk reduction process of GB/T 15706. Therefore, applying In GB/T 16855.1, it is no longer necessary to carry out a separate risk assessment.

Figure A.1 given in GB/T 16855.1-2008 is only suitable for selecting PLr for the safety function and cannot be used for The machine makes an overall risk estimate.

Note 3: Some C standards have given the value of PLr for specific safety functions.

c) expected performance specifications related to risk reduction/protection measures, such as.

- 1) a general description of the intended function of the risk reduction/protection measure (related to the functional requirements);
- 2) the specific safety-related characteristics of the risk reduction/protection measures (e.g. response time, mode of operation);
- 3) description of environmental conditions related to risk reduction/protection measures (e.g. space constraints, temperature, humidity, vibration);
- 4) Description of other machine and/or process specific conditions [eg specified safety-related elements (sensors, control actuators)].

GB/T 16855.1 5.3 Output information obtained from The following output information of GB/T 16855.1 is obtained from the detailed design of the safety-related control system and is the necessary input of GB/T 15706 information in order to complete the overall risk assessment and risk reduction process.

- a) The results of verification and validation in accordance with GB/T 16855.1 and GB/T 16855.2 are used to prove that the expected risk reduction has been This is achieved through selected risk reduction measures.
- b) Meets Chapter 10 of GB/T 16855.1-2008, technical documentation for integrating technical solutions into machine design.
- c) Satisfy the use information in Chapter 11 of GB/T 16855.1-2008 (to ensure the correct use of the control system safety-related components and Relevant risk reduction/protection measures, relevant information provided by the machine designer to the machine user).